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REMARKS

This paper is responsive to the Office Action dated December 16, 2003 (Paper No. 12), which is the first action on the merits of the application.

Claims 1-22 were previously pending in the application; claims 1-15 were under examination. Upon entry of this Amendment, claims 16-22 are canceled, and claims 23-47 are added. The added claims fall within the group under examination. Accordingly, claims 1-15 and 23-47 are now pending in the application and under examination.

Further consideration and allowance of the application is respectfully requested.

Interview:

Applicant thanks Examiner Joseph Woitach for the courtesy of an interview with Michael Schiff at the Patent Office on March 11, 2004. Recommendations made by the examiner have been incorporated into the claim amendments and remarks presented herein. The application is now believed to be in condition for allowance.

Claim amendments:

Claims in the application have the following features:

- Independent claim 14 and claims depending therefrom cover methods for producing a cell population by genetically altering undifferentiated stem cells in a population, and then causing at least some of the cells to differentiate. The genetic alteration enables undifferentiated stem cells to be depleted, if desired, in an optional subsequent step (claim 15).
- Independent claim 1 and claims depending therefrom cover methods for depleting undifferentiated stem cells from a mixed cell population. Undifferentiated cells in the population are genetically altered, and then the undifferentiated cells are depleted.
- Independent claim 31 and claims depending therefrom cover methods for preparing a cell population in a manner that parallels claim 14, but limited to hES cells and their equivalents.
- Independent claim 43 and claims depending therefrom cover methods for depleting undifferentiated cells in a manner that parallels claim 1, but limited to hES cells and their equivalents.

The claim amendments do not add new matter to the disclosure. The use of adenovirus for making a transient genetic alteration (claim 23), and retrovirus or DNA plasmids for making an inheritable alteration (claim 24), is illustrated in Example 5 (page 31 ff.), and Example 7 (page 33 ff.). The use of an endogenous or heterologous promoter for driving expression (claims 32-33) is supported on page 5, lines 21-23. Differentiation of hES cells into neural cells or hepatocytes is described in the specification in page 17, line 29 to page 18, line 3. Formulating the differentiated cells for administration to a mammalian host (the final procedure in claims 31 and 43) is described in the section on page 25.

The other new claims are supported by claims 1-15 as previously presented. It is understood that the claims permit but do not require that all of the cells in the respective cell population be genetically altered in the manner specified. What the claims indicate is that some undifferentiated stem cells in the population are genetically altered, such that expression of the new cell surface antigen can be used effectively to remove some of the stem cells at a subsequent time, if performed or desired.

The subject matter of cancelled claims 17-22 will be pursued in a divisional application. Applicant reserves the right to introduce claims in this or any related application for any subject matter previously claimed or described in the specification.

Claim objection

Claim 10 is objected to as not further limiting claim 14 from which it depends.

In fact, claim 14 requires only that the cells *contain* the structure P-X after being genetically altered. As described in the specification on page 5, lines 21 ff., this can be accomplished not only by introducing P-X into the cell as a complete construct, but also by transfecting the cells so as to place a heterologous encoding region (X) next to a promoter (P) that is already present in the genome. The skilled reader will appreciate that there are other ways of constructing P-X in the cell, such as placing a heterologous promoter (P) next to an endogenous encoding region (X), or introducing a heterologous P and X into the cell as separate constructs so that they ultimately become operatively linked.

Claim 10 further limits claim 14 by explicitly indicating that P-X is introduced into the cell as a single construct.

Rejection under 35 USC § 112 ¶ 1:

Claim 15 and 5-8 stand rejected under the enablement requirements of § 112 ¶ 1. The Office Action indicates that the specification generally enables the making and use of cells genetically altered

with a heterologous construct that expresses a cell surface antigen in undifferentiated cells. However, it indicates that the use of glycosyltransferases and complement to lyse undifferentiated cells requires undue experimentation.

Applicant respectfully disagrees. All of the components needed to process cell populations according to these claims can be performed using commercially available reagents. Design and optimization of the experimental protocol falls well within the routine experimentation allowed by the *Wands* standard.

1. Selection of glycosyltransferase.

Many glycosyltransferases made by vertebrates are exquisitely specific: they transfer only a single type of sugar substrate in only one position and orientation to an exact acceptor structure recognized by the enzyme several monosaccharides deep. Glycosyltransferases are in this respect at least as specific as antibody molecules. The specificity is necessary, because they build elaborate and well-defined structures that in turn provide recognition sites for adhesion molecules implicated in embryogenesis, tissue growth and repair, lymphocyte migration and other intercellular recognition events. There are about 50 c-type lectins and 10 galectins known to be involved in binding activity mediated by cell surface carbohydrates (Gorelik et al., Cancer Metastasis Rev. 2001;20:245-77).

Exemplary is α(1,3)galactosyltransferase (claim 7). It uses UDP-galactose as a source of galactose, which it transfers specifically to an acceptor oligosaccharide, usually Galβ(1,4)GlcNAc (N-acetyl lactosamine). All mammals express this enzyme, except for cattharines (upper primates, including humans). In humans, α(1,2)fucosyltransferase builds the N-acetyl lactosamine into Fucα(1,2)Galβ(1,4)GlcNAc, which is blood group H substance. This in turn serves as an acceptor substance for blood group A GlcNAc-transferase, or blood group B Gal-transferase (claim 8), forming A-substance or B-substance, respectively, depending on the blood type of the individual. A number of genes for other glycosyltransferases involved in forming blood group antigens or other cell surface carbohydrates are available (see Appendix A).

Blood group carbohydrates appear on most cell types in the body, including stem cells. Accordingly, sequences encoding α(1,3)galactosyltransferase, blood group A transferase, and blood group B transferase would all be useable, or any other glycosyltransferase enzyme forming a defined carbohydrate antigen not normally present in the cell population being processed.

2. *Obtaining antibody or lectin against the determinant formed by the glycosyltransferase*

Because each glycosyltransferase makes an exact carbohydrate structure with its own antigenic features, it is relatively easy to make antibody that will specifically recognize it. As indicated in the specification, there are often naturally occurring antibodies present in the circulation of mammals against carbohydrate structures that are not self-antigens (page 21, line 17 ff.). This is thought to occur because of cross-reactive carbohydrate determinants present in the diet. Since the cells of claims 5-8 are engineered to express a new carbohydrate determinant, human serum may be a ready source of antibody to perform the depletion step. If not, then specific monoclonal or polyclonal antibody can be raised according to standard techniques (specification page 21, lines 3-16).

Alternatively, there is a wide range of lectins commercially available that are highly specific for particular carbohydrate determinants, such as blood group substances (See Appendix B).

3. *Depleting cells expressing the carbohydrate determinant*

As indicated in the specification, depletion of undifferentiated cells according to claims 15 or 6-8 can be effected using a variety of separation techniques mediated by specific antibody or lectin: for example, immunoadsorption or fluorescence activated cell sorting (page 21, line 30 ff.). In fact, a number of lectins specific for blood group determinants come already labeled with a fluorochrome such as FITC or TRITC, or linked to a solid support like agarose (Appendix B).

Another suitable technique is complement-mediated lysis (claim 5). This is performed by combining the cells with antibody and a source of complement, and simply incubating to effect lysis.

The skilled reader will know that most sources of mammalian complement will work, because of the events that initiate complement lysis. Binding of antigenic determinants by specific IgG antibody via the IgG Fab region activates complement component C1q through the IgG Fc region. This initiates the classic activation cascade, which forms the membrane attach complex and causes lysis. The binding of C1q to IgG is not species specific.

For this reason, guinea pig serum is often used as a source of complement with antibody from other species (Appendix C), even though specific antibody is rarely made in guinea pigs. Fresh human serum is also a suitable source. Where the cells have been modified to express a blood group antigen (claims 7-8), human serum can be used to provide both the antibody and the complement at the same time.

Applicant respectfully submits that depletion of undifferentiated stem cells expressing glycosyltransferase using specific antibody and complement can be performed with standard reagents using standard techniques. Withdrawal of this rejection is requested.

Rejections under 35 USC § 112 ¶ 2:

Claims 1, 10, 11, 12, and 13 stand rejected for being indefinite or unclear.

Claims 1, 10, and 11 have been amended in a manner that is believed to overcome the concerns raised in the Office Action. Definition of what is meant by an "endogenous" promoter on page 10, lines 36-41 resolves the issue raised with respect to claim 11.

Claims 12 and 13 are rejected for referring to genetic alterations that are transient or permanent. The meaning of these terms is explained on page22, lines 28-25; and page 10, line 16. Use of adenovirus for making a transient genetic alteration, and retrovirus or DNA plasmids for making an inheritable alteration, is illustrated in Example 5 (page 31 ff.), and Example 7 (page 33 ff.).

Withdrawal of these rejections is respectfully requested.

Rejections under 35 USC § 102:

Claims 1-4, 9-10, and 14-15 stand rejected as being anticipated by U.S. Patent 6,146,888 (Smith et al.). The Office Action indicates that the reference focuses on isolation of stem cells [not differentiated cells], but the remaining population would be considered depleted of stem cells.

Applicant does not agree. Since the reference is focused on removing differentiated cells from stem cell populations, its objective is opposite of this invention, which is to enable removal of stem cells from differentiated cell populations. The "remaining" differentiated cells would be discarded, and neither Smith et al. nor the skilled reader can truly be said to be placed in *possession* of the invention claimed here in a manner that adequately supports a § 102 rejection.

By way of this amendment, the claims have been amended to provide a further distinguishing feature. Claims 1 and 14 now indicate that after depleting or differentiating the cells, the differentiated cells are then subject to further culturing. In contrast, Smith et al. is focused on things that can be done with the undifferentiated cells, and there is no motivation to recover the differentiated cells for culturing or any other purpose.

New independent claims 31 and 43 are distinguished from Smith et al. for the same reason. Since Smith et al. is focused on things that can be done with the undifferentiated cells, there is no motivation to recover the differentiated cells and administer them to a mammalian host.

Withdrawal of this rejection is respectfully requested.

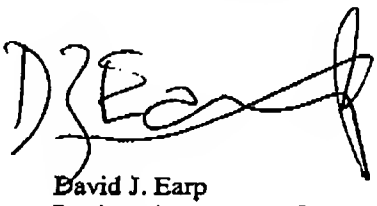
Request for further interview

The application is believed to be in condition for allowance, and a prompt Notice of Allowance is requested.

In the event that the Examiner determines that there are other matters to be addressed, applicant hereby requests an interview by telephone.

Accompanying this Response are papers authorizing the Commissioner to charge the Deposit Account for the fees due. Should the Patent Office determine that a further extension of time or any other relief is required for further consideration of this application, applicant hereby petitions for such relief, and authorizes the Assistant Commissioner to charge the cost of such petitions and other fees due in connection with the filing of these papers to Deposit Account No. 07-1139, referencing the docket number indicated above.

Respectfully submitted,



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APPENDIX A:

Listing of glycosyltransferase enzymes according to Enzyme Commission (EC) designation

IntEnz

- Home
- Search tips
- Display information
- About IntEnz
- Future development
- EC 2
- EC 2.4

EC 2 Transferases

EC 2.4 Glycosyltransferases

EC 2.4.1 Glycosyltransferases

Conte

2.4.1.1	phosphorylase
2.4.1.2	dextrin dextranase
2.4.1.3	*Now included with EC 2.4.1.25*
2.4.1.4	amylosucrase
2.4.1.5	dextransucrase
2.4.1.6	deleted
2.4.1.7	sucrose phosphorylase
2.4.1.8	maltose phosphorylase
2.4.1.9	inulosucrase
2.4.1.10	levansucrase
2.4.1.11	glycogen (starch) synthase
2.4.1.12	cellulose synthase (UDP-forming)
2.4.1.13	sucrose synthase
2.4.1.14	sucrose-phosphate synthase
2.4.1.15	α,α-trehalose-phosphate synthase (UDP-forming)
2.4.1.16	chitin synthase
2.4.1.17	glucuronosyltransferase
2.4.1.18	1,4-α-glucan branching enzyme
2.4.1.19	cyclomaltodextrin glucanotransferase
2.4.1.20	cellobiose phosphorylase
2.4.1.21	starch synthase
2.4.1.22	lactose synthase
2.4.1.23	sphingosine β-galactosyltransferase
2.4.1.24	1,4-α-glucan 6-α-glucosyltransferase
2.4.1.25	4-α-glucanotransferase
2.4.1.26	DNA α-glucosyltransferase
2.4.1.27	DNA β-glucosyltransf rase

2.4.1.28 glucosyl-DNA β-glucosyltransferase
2.4.1.29 cellulose synthase (GDP-forming)
2.4.1.30 1,3-β-oligoglucan phosphorylase
2.4.1.31 laminaribiose phosphorylase
2.4.1.32 glucomannan 4-β-mannosyltransferase
2.4.1.33 alginate synthase
2.4.1.34 1,3-β-glucan synthase
2.4.1.35 phenol β-glucosyltransferase
2.4.1.36 α,α-trehalose-phosphate synthase (GDP-forming)
2.4.1.37 fucosylgalactoside 3-α-galactosyltransferase
2.4.1.38 β-*N*-acetylglucosaminylglycopeptide β-1,4-galactosyltransferase
2.4.1.39 steroid *N*-acetylglucosaminyltransferase
2.4.1.40 glycoprotein-fucosylgalactoside α-*N*-acetylgalactosaminyltransferase
2.4.1.41 polypeptide *N*-acetylgalactosaminyltransferase
2.4.1.42 *Now included with EC 2.4.1.17*
2.4.1.43 polygalacturonate 4-α-galacturonosyltransferase
2.4.1.44 lipopolysaccharide 3-α-galactosyltransferase
2.4.1.45 2-hydroxyacylsphingosine 1-β-galactosyltransferase
2.4.1.46 1,2-diacylglycerol 3-β-galactosyltransferase
2.4.1.47 *N*-acylsphingosine galactosyltransferase
2.4.1.48 heteroglycan α-mannosyltransferase
2.4.1.49 cellodextrin phosphorylase
2.4.1.50 procollagen galactosyltransferase
2.4.1.51 *Now listed as EC 2.4.1.101, EC 2.4.1.143, EC 2.4.1.144 and EC 2.4.1.145*
2.4.1.52 poly(glycerol-phosphate) α-glucosyltransferase
2.4.1.53 poly(ribitol-phosphate) β-glucosyltransferase
2.4.1.54 undecaprenyl-phosphate mannosyltransferase
2.4.1.55 *Now EC 2.7.8.14*
2.4.1.56 lipopolysaccharide *N*-acetylglucosaminyltransferase
2.4.1.57 phosphatidylinositol α-mannosyltransferase
2.4.1.58 lipopolysaccharide glucosyltransferase I
2.4.1.59 *Now included with EC 2.4.1.17*
2.4.1.60 abequosyltransferase
2.4.1.61 *Now included with EC 2.4.1.17*
2.4.1.62 ganglioside galactosyltransferase
2.4.1.63 linamarin synthase
2.4.1.64 α,α-trehalose phosphorylase
2.4.1.65 3-α-galactosyl-*N*-acetylglu osaminide 4-α-l-fu osyltransferase

2.4.1.66 procollag n glucosyltransferase
2.4.1.67 galactinol—raffinose galactosyltransferase
2.4.1.68 glycoprotein 6-α-L-fucosyltransferase
2.4.1.69 galactoside 2-α-L-fucosyltransferase
2.4.1.70 poly(ribitol-phosphate) *N*-acetylglucosaminyltransferase
2.4.1.71 arylamine glucosyltransferase
2.4.1.72 *Now EC 2.4.2.24*
2.4.1.73 lipopolysaccharide glucosyltransferase II
2.4.1.74 glycosaminoglycan galactosyltransferase
2.4.1.75 UDP-galacturonosyltransferase
2.4.1.76 *Now included with EC 2.4.1.17*
2.4.1.77 *Now included with EC 2.4.1.17*
2.4.1.78 phosphopolyprenol glucosyltransferase
2.4.1.79 galactosylgalactosylglucosylceramide β-D-acetylgalactosaminyltransferase
2.4.1.80 ceramide glucosyltransferase
2.4.1.81 flavone 7-*O*-β-glucosyltransferase
2.4.1.82 galactinol—sucrose galactosyltransferase
2.4.1.83 dolichyl-phosphate β-D-mannosyltransferase
2.4.1.84 *Now included with EC 2.4.1.17*
2.4.1.85 cyanohydrin β-glucosyltransferase
2.4.1.86 glucosaminylgalactosylglucosylceramide β-galactosyltransferase
2.4.1.87 *N*-acetyllactosaminide 3-α-galactosyltransferase
2.4.1.88 globoside α-*N*-acetylgalactosaminyltransferase
2.4.1.89 *Now included with EC 2.4.1.69*
2.4.1.90 *N*-acetyllactosamine synthase
2.4.1.91 flavonol 3-*O*-glucosyltransferase
2.4.1.92 (*N*-acetylneuraminyl)-galactosylglucosylceramide *N*-acetylgalactosaminyltransferase
2.4.1.93 inulin fructotransferase (depolymerizing, difructofuranose-1,2':2,3'-dianhydride-forming)
2.4.1.94 protein *N*-acetylglucosaminyltransferase
2.4.1.95 bilirubin-glucuronoside glucuronosyltransferase
2.4.1.96 *sn*-glycerol-3-phosphate 1-galactosyltransferase
2.4.1.97 1,3-β-D-glucan phosphorylase
2.4.1.98 *Now included with EC 2.4.1.90*
2.4.1.99 sucrose 1^F-fructosyltransferase
2.4.1.100 1,2-β-fructan 1^F-fructosyltransferase
2.4.1.101 α-1,3-mannosyl-glycoprotein 2-β-*N*-acetylglucosaminyltransferas

2.4.1.102 β-1,3-galactosyl-*O*-glycosyl-glycoprotein β-1,6-*N*-acetylglucosaminyltransferase

2.4.1.103 alizarin 2-β-glucosyltransferase

2.4.1.104 *o*-dihydroxycoumarin 7-*O*-glucosyltransferase

2.4.1.105 vitexin β-glucosyltransferase

2.4.1.106 isovitexin β-glucosyltransferase

2.4.1.107 *Now included with EC 2.4.1.17*

2.4.1.108 *Now included with EC 2.4.1.17*

2.4.1.109 dolichyl-phosphate-mannose—protein mannosyltransferase

2.4.1.110 tRNA-queuosine β-mannosyltransferase

2.4.1.111 coniferyl-alcohol glucosyltransferase

2.4.1.112 α-1,4-glucan-protein synthase (UDP-forming)

2.4.1.113 α-1,4-glucan-protein synthase (ADP-forming)

2.4.1.114 2-coumarate *O*-β-glucosyltransferase

2.4.1.115 anthocyanidin 3-*O*-glucosyltransferase

2.4.1.116 cyanidin-3-rhamnosylglucoside 5-*O*-glucosyltransferase

2.4.1.117 dolichyl-phosphate β-glucosyltransferase

2.4.1.118 cytokinin 7-β-glucosyltransferase

2.4.1.119 dolichyl-diphosphooligosaccharide—protein glycotransferase

2.4.1.120 sinapate 1-glucosyltransferase

2.4.1.121 indole-3-acetate β-glucosyltransferase

2.4.1.122 glycoprotein-*N*-acetylgalactosamine 3-β-galactosyltransferase

2.4.1.123 inositol 3-α-galactosyltransferase

2.4.1.124 *Now included with EC 2.4.1.87, N-acetyllactosaminide3-alpha-galactosyltransferase.*

2.4.1.125 sucrose—1,6-α-glucan 3(6)-α-glucosyltransferase

2.4.1.126 hydroxycinnamate 4-β-glucosyltransferase

2.4.1.127 monoterpenol β-glucosyltransferase

2.4.1.128 scopoletin glucosyltransferase

2.4.1.129 peptidoglycan glycosyltransferase

2.4.1.130 dolichyl-phosphate-mannose—glycolipid α-mannosyltransferase

2.4.1.131 glycolipid 2-α-mannosyltransferase

2.4.1.132 glycolipid 3-α-mannosyltransferase

2.4.1.133 xylosylprotein 4-β-galactosyltransferase

2.4.1.134 galactosylxylosylprotein 3-β-galactosyltransferase

2.4.1.135 galactosylgalactosylxylosylprotein 3-β-glucuronosyltransferase

2.4.1.136 gallate 1-β-glucosyltransferase

2.4.1.137 *sn*-glyc rol-3-phosphate 2-α-galactosyltransferase

2.4.1.138 mannotetraose 2-α-*N*-acetylglucosaminyltransferase

2.4.1.139 maltose synthase

2.4.1.140 alternansucrase

2.4.1.141 *N*-acetylglucosaminyldiphosphodolichol *N*-acetylglucosaminyltransferase

2.4.1.142 chitobiosyldiphosphodolichol β-mannosyltransferase

2.4.1.143 α-1,6-mannosyl-glycoprotein 2-β-*N*-acetylglucosaminyltransferase

2.4.1.144 β-1,4-mannosyl-glycoprotein 4-β-*N*-acetylglucosaminyltransferase

2.4.1.145 α-1,3-mannosyl-glycoprotein 4-β-*N*-acetylglucosaminyltransferase

2.4.1.146 β-1,3-galactosyl-*O*-glycosyl-glycoprotein β-1,3-*N*-acetylglucosaminyltransferase

2.4.1.147 acetylgalactosaminyl-*O*-glycosyl-glycoprotein β-1,3-*N*-acetylglucosaminyltransferase

2.4.1.148 acetylgalactosaminyl-*O*-glycosyl-glycoprotein β-1,6-*N*-acetylglucosaminyltransferase

2.4.1.149 *N*-acetyllactosaminide β-1,3-*N*-acetylglucosaminyltransferase

2.4.1.150 *N*-acetyllactosaminide β-1,6-*N*-acetylglucosaminyl-transferase

2.4.1.151 *Now included with EC 2.4.1.87*

2.4.1.152 4-galactosyl-*N*-acetylglucosaminide 3-α-L-fucosyltransferase

2.4.1.153 dolichyl-phosphate α-*N*-acetylglucosaminyltransferase

2.4.1.154 globotriosylceramide β-1,6-*N*-acetylgalactosaminyl-transferase

2.4.1.155 α-1,6-mannosyl-glycoprotein 6-β-*N*-acetylglucosaminyltransferase

2.4.1.156 indolylacetyl-*myo*-inositol galactosyltransferase

2.4.1.157 1,2-diacylglycerol 3-glucosyltransferase

2.4.1.158 13-hydroxydocosanoate 13-β-glucosyltransferase

2.4.1.159 flavonol-3-*O*-glucoside L-rhamnosyltransferase

2.4.1.160 pyridoxine 5'-*O*-β-D-glucosyltransferase

2.4.1.161 oligosaccharide 4-α-D-glucosyltransferase

2.4.1.162 aldose β-D-fructosyltransferase

2.4.1.163 β-galactosyl-*N*-acetylglucosaminylgalactosylglucosyl-ceramide β-1,3-acetylglucosaminyltransferase

2.4.1.164 galactosyl-*N*-acetylglucosaminylgalactosylglucosyl-ceramide β-1,6-*N*-acetylglucosaminyltransferase

2.4.1.165 *N*-acetylneuraminylgalactosylglucosylceramide β-1,4-*N*-acetylgalactosaminyltransferase

2.4.1.168 xyloglucan 4-glucosyltransferase

2.4.1.169 xyloglucan 6-xylosyltransferase

2.4.1.170 isoflavone 7-*O*-glucosyltransferase

2.4.1.171 methyl-*ONN*-azoxymethanol β-D-glucosyltransferase

2.4.1.172 salicyl-alcohol β-D-glucosyltransferase

2.4.1.173 sterol 3β-glucosyltransferase

2.4.1.174 glucuronylgalactosylproteoglycan 4-β-*N*-acetylgalactosaminyltransferase

2.4.1.175 glucuronosyl-*N*-acetylgalactosaminyl-proteoglycan 4-β-*N*-acetylgalactosaminyltransferase

2.4.1.176 gibberellin β-D-glucosyltransferase

2.4.1.177 cinnamate β-D-glucosyltransferase

2.4.1.178 hydroxymandelonitrile glucosyltransferase

2.4.1.179 lactosylceramide β-1,3-galactosyltransferase

2.4.1.180 lipopolysaccharide *N*-acetylmannosaminouronosyltransferase

2.4.1.181 hydroxyanthraquinone glucosyltransferase

2.4.1.182 lipid-A-disaccharide synthase

2.4.1.183 α-1,3-glucan synthase

2.4.1.184 galactolipid galactosyltransferase

2.4.1.185 flavanone 7-*O*-β-glucosyltransferase

2.4.1.186 glycogenin glucosyltransferase

2.4.1.187 *N*-acetylglucosaminyldiphosphoundecaprenol *N*-acetyl-β-D-mannosaminyltransferase

2.4.1.188 *N*-acetylglucosaminyldiphosphoundecaprenol glucosyltransferase

2.4.1.189 luteolin 7-*O*-glucuronosyltransferase

2.4.1.190 luteolin-7-*O*-glucuronide 7-*O*-glucuronosyltransferase

2.4.1.191 luteolin-7-*O*-diglucuronide 4'-*O*-glucuronosyltransferase

2.4.1.192 nuatigenin 3β-glucosyltransferase

2.4.1.193 sarsapogenin 3β-glucosyltransferase

2.4.1.194 4-hydroxybenzoate 4-*O*-β-D-glucosyltransferase

2.4.1.195 thiohydroximate β-D-glucosyltransferase

2.4.1.196 nicotinate glucosyltransferase

2.4.1.197 high-mannose-oligosaccharide β-1,4-*N*-acetylglucosaminyltransferase

2.4.1.198 phosphatidylinositol *N*-acetylglucosaminyltransferase

2.4.1.199 β-mannosylphosphodecaprenol—mannooligosaccharide 6-mannosyltransferase

2.4.1.200 inulin fructotransferase (depolymerizing, difructofuranose-1,2':2',1-dianhydride-forming)

2.4.1.201 α-1,6-mannosyl-glycoprotein 4-β-*N*-acetylglucosaminyltransferase

2.4.1.202 2,4-dihydroxy-7-methoxy-2*H*-1,4-benz xazin-3(4*H*)-on 2-D-glucosyltransferase

2.4.1.203 *trans*-zeatin *O*-β-D-glucosyltransferase

2.4.1.204 zeatin *O*-β-D-xylosyltransferase

2.4.1.205 galactogen 6β-galactosyltransferase

2.4.1.206 lactosylceramide 1,3-*N*-acetyl-β-D-glucosaminyltransferase

2.4.1.207 xyloglucan:xyloglucosyl transferase

2.4.1.208 diglucosyl diacylglycerol synthase

2.4.1.209 *cis*-*p*-coumarate glucosyltransferase

2.4.1.210 limonoid glucosyltransferase

2.4.1.211 1,3-β-galactosyl-*N*-acetylhexosamine phosphorylase

2.4.1.212 hyaluronan synthase

2.4.1.213 glucosylglycerol-phosphate synthase

2.4.1.214 glycoprotein 3-α-L-fucosyltransferase

2.4.1.215 *cis*-zeatin *O*-β-D-glucosyltransferase

2.4.1.216 trehalose 6-phosphate phosphorylase

2.4.1.217 mannosyl-3-phosphoglycerate synthase

2.4.1.218 hydroquinone glucosyltransferase

2.4.1.219 vomilenine glucosyltransferase

2.4.1.220 Indoxyl-UDPG glucosyltransferase

2.4.1.221 peptide-*O*-fucosyltransferase

2.4.1.222 *O*-fucosylpeptide 3-β-*N*-acetylglucosaminyltransferase

2.4.1.223 glucuronyl-galactosyl-proteoglycan 4-α-*N*-acetylglucosaminyltransferase

2.4.1.224 glucuronosyl-*N*-acetylglucosaminyl-proteoglycan 4-α-*N*-acetylglucosaminyltransferase

2.4.1.225 *N*-acetylglucosaminyl-proteoglycan 4-β-glucuronosyltransferase

2.4.1.226 *N*-acetylgalactosaminyl-proteoglycan 3-β-glucuronosyltransferase

2.4.1.227 undecaprenyldiphospho-muramoylpentapeptide β-*N*-acetylglucosaminyltransferase

2.4.1.228 lactosylceramide 4-α-galactosyltransferase

2.4.1.229 [Skp1-protein]-hydroxyproline *N*-acetylglucosaminyltransferase

2.4.1.230 kojibiose phosphorylase

2.4.1.231 α,α-trehalose phosphorylase (configuration-retaining)

APPENDIX B:

Lectins available from Sigma-Aldrich: 2002-2003 catalog

(Continuation of)
Lectin

Lectin 1 mg 94.95
from *Pseudomonas aeruginosa* 2 mg 170.70
PA-I
Lyophilized powder
Pseudomonas aeruginosa lectin I (PA-I) has a major affinity for D-galactose and its derivatives.[1] Extracts from *Pseudomonas aeruginosa* cells contain another lectin, PA-II which is specific for fucose.[1]
PA-I agglutinates all types of human and animal erythrocytes and interacts also with unicellular protozoa, algae and bacteria.[2] PA-I induces mitogenic stimulation in cultured human lymphocytes pretreated with neuraminidase.
Highly purified.
Lyophilized powder containing approx. 80% protein (Biuret), balance primarily sodium citrate, plus traces of calcium chloride, magnesium chloride and manganese chloride
Purified by affinity chromatography using a modification of Gilboa-Garber.
Package size based on protein content
Agglutination activity is expressed in µg per ml and is determined from serial dilutions of a 1 mg per ml solution using phosphate buffered saline, pH 7.0. This activity is the lowest concentration to agglutinate a 2% suspension of neuraminidase treated human blood group A erythrocytes after one hr incubation at 25 °C.
Potency: <15 µg per ml
Ref.: Gilboa-Garber, N., *Meth. Enzymol.* **83**, 378 (1982)

Lectin 1 mg 48.50
from *Agaricus bisporus* 2 mg 86.15
Agaricus bisporus agglutinin (ABA) is not blood group specific, but has an affinity for fetuin.
ABA is a mixture of two phytohemagglutinins with similar specificities for carbohydrate receptors.[1]
Lyophilized powder containing NaCl
Purified by affinity chromatography.
Agglutination activity is expressed in µg per ml and is determined from serial dilutions in phosphate buffered saline, pH 6.8, of a 1 mg per ml solution. This activity is the lowest concentration to agglutinate a 2% suspension of human blood group O erythrocytes after 1 hr incubation at 25 °C.
Potency: <16 µg protein per ml
Protein approx. 10% by Biuret
Ref.: Pretsch, C. A. and Kornfeld, S., *J. Biol. Chem.* **247**, 6937 (1972)

Lectin 5 mg 125.15
from Cicer arietinum (chick pea)
Lectin from Cicer arietinum (chick pea)
Lyophilized powder
Purified.
Lyophilized powder containing sodium acetate and sodium chloride
Potency: <20 µg per mL
Protein approx. 80% by Biuret

Lectin 1 mg 33.90
from Datura stramonium (jimson weed, thorn apple) 5 mg 133.65
Lyophilized powder
Highly purified
Purified by affinity chromatography
Potency: ≤10 µg per mL
salt ..... essentially free
Ref.: 1. Young, N.M., et al., *Biochem. J.* **222**, 451 (1984)
2. Cronsky, H.I., et al., *Arch. Biochem. Biophys.* **231**, 524 (1984)

L 7400 [Lec]
Lectin 5 mg 81.20
from Euonymus europaeus (spindle tree) 10 mg 146.35
Lyophilized powder
Euonymus europaeus agglutinin (EEA) has anti-B+H blood group specificity and is reported to be most specific for blood group B oligosaccharides having the structure α-D-Gal[1→3](α-L-Fuc[1→2])-β-D-Gal[1→3/4)-β-D-GlcNac. The B+H specificity is an intrinsic property of a single lectin binding site.[1]
Lyophilized powder containing sodium chloride and phosphate buffer salts
Agglutination activity is expressed in µg per mL and is determined from serial dilutions in phosphate buffered saline, pH 7.2, of a 1 mg per mL solution. This activity is the lowest concentration of lectin to agglutinate a 2% suspension of neuraminidase-treated human blood group B erythrocytes after 1 hr incubation at 25 °C.
Potency: <1 µg per mL (using neuraminidase-treated Type B red blood cells.)
Protein approx. 5% by Lowry
Ref.: Fetyman, R. et al., *Arch Biochem Biophys.* **178**, 118 (1977)

L 8025 [A-Fuc]
Lectin 5 mg 107.10
from *Maackia amurensis*
Lyophilized powder
Maackia amurensis agglutinin (MAA) interacts with sialic acid-containing glycoconjugates.
MAA consists of two molecular species, a strongly hemagglutinating hemagglutinin (MAH) and a strongly mitogenic hemagglutinin (MAI). The mitogenic activity of the latter is inhibited by α-sialyl-[2→3]-lactose. MAA could be useful for fractionation of sialylated oligosaccharides.
Purified by affinity chromatography using a modification of the method of Wang, W.-C. and Cummings, R.D., *J. Biol. Chem.*, **263**, 4576 (1988).
Agglutination activity is expressed in µg per ml and is determined from serial dilutions in phosphate buffered saline, pH 7.2 of a 1 mg per ml solution. This activity is the lowest concentration to agglutinate a 2% suspension of fresh human erythrocytes, type O, after 1 hr incubation at 25 °C.
Potency: <10 µg per ml
salt ..... essentially free
Ref.: 1. Kawagoshi, T., et al., *J. Biol Chem.* **249**, 7785 (1974)
2. Kabbe, R.N., et al., *J. Biol. Chem.* **266**, 83 (1991)

L 5650 [L-Fuc]
Lectin 5 mg 56.90
from *Narcissus pseudonarcissus* (daffodil)
Lyophilized powder
Narcissus pseudonarcissus lectin (NPA) agglutinates trypsinized rabbit erythrocytes with high efficiency and untreated rabbit erythrocytes less so; human erythrocytes are not agglutinated.[1] NPA sugar specificity is directed to terminal and internal α-D-mannosyl residues of glycoconjugates.[2]
Highly purified
Purified by affinity chromatography according to Kaku, H. and Goldstein, I.J., *Meth. Enzymol.*, **179**, 377 (1989).
Agglutination activity is expressed in µg per ml and is determined from serial dilution in phosphate buffered saline, pH 7.2, of a 1 mg per ml solution.
This activity is the lowest concentration to agglutinate a 2% suspension of trypsinized rabbit erythrocytes after 1 hr incubation at 25 °C.
Potency: <1 µg per ml
salt ..... essentially free
Ref.: 1. Kaku, H. and Goldstein, I.J., *Meth. Enzymol.* **179**, 377 (1989)
2. VanDamme, M.A., et al., *Physiol Plant* **73**, 52 (1988)

L 6890 [Gal]
Lectin 1 mg 60.45
from *Sambucus nigra* (elder) 2 mg 90.35
Lyophilized powder
Sambucus nigra bark agglutinin (SNA) is isolated from the inner bark (bast tissue) of elder stems and branches.[1] The lectin is not blood group specific but has an affinity for α-NeuNAc-[2→6]-Gal, α-NeuNAc-[2→6]-GalNAc, and, to a lesser extent, α-NeuNAc-[2→3]-Gal residues.[2]
Highly purified.
Lyophilized powder containing NaCl
Affinity purified by a modification of Broekaert, W.F., et al., *Biochem. J.*, **228**, 163 (1984).
Package size based on protein content
Agglutination activity is expressed in µg per ml and is determined from serial dilutions in phosphate buffered saline, pH 7.3, of a 1 mg per ml solution.
The activity is the lowest concentration to agglutinate a 2% suspension of human blood group A erythrocytes after 1 hr incubation at 25 °C.
Protein approx. 30% by Lowry
Ref.: 1. Shibuya, N., et al., *J. Biol. Chem.* **262**, 1596 (1987)
2. Broekaert, W.F., et al., *Biochem. J.* **228**, 163 (1984)

L 4286 [A-Fuc]
Lectin 5 mg 420.40
from *Solanum tuberosum* (potato)
STA; Solanum tuberosum agglutinin
Lyophilized powder
Solanum tuberosum agglutinin (STA) is not blood group specific, but has an affinity for N-acetyl-β-D-glucosamine oligomers.[1] STA is a glycoprotein containing approx. equal amounts of protein and carbohydrate.[1]
Conjugates are prepared from affinity purified lectin.
Solanum tuberosum agglutinin (STA) is not blood group specific, but has an affinity for N-acetyl-β-D-glucosamine oligomers.[1] STA is a glycoprotein containing approx. equal amounts of protein and carbohydrate.[1]
Conjugates are prepared from affinity purified lectin.
STA is not blood group specific, but has an affinity for N-acetyl-β-D-glucosamine oligomers. STA is a glycoprotein containing approx. equal amounts of protein and carbohydrate.
Highly purified.
Lyophilized powder containing NaCl
Affinity purified by a modification of the method of Matsumoto, I., et al., *J. Biol. Chem.*, **258**, 2886 (1983).
Agglutination activity is expressed in µg per ml and is determined from serial dilutions in phosphate buffered saline, pH 6.8, of a 1 mg per ml solution. This activity is the lowest concentration to agglutinate a 2% suspension of human erythrocytes after 1 hr incubation at 25°C.
Potency: <7 µg per mL
Glycoprotein carbohydrate approx. 20%
Protein approx. 20% by Lowry
Ref.: Allen, A.K. and Neuberger, A., *Biochem. J.* **135**, 307 (1973)
Ref.: Allen, A.K., Neuberger, A., *Biochem J.* **135**, 307 (1973)

L 2662 [Lac]
Lectin 1 mg 66.40
from Viscum album (European mistletoe)
VAA; Viscum album agglutinin
Lyophilized powder
Viscum album agglutinin (VAA) is not blood group specific, but has an affinity for terminal β-D-galactosyl residues.[1] VAA inhibits protein synthesis similarly to Ricin (RCA_{60}) and inhibits allergen induced histamine release *in vitro* from human leukocytes.[2]
VAA is not blood group specific, but has affinity for terminal β-D-galactosyl residues. VAA inhibits protein synthesis similarly to ricin (RCA_{60}) and inhibits allergen-induced histamine release *in vitro* from human leukocytes.
Highly purified, lyophilized powder containing phosphate buffer salts
Purified by affinity chromatography using a modification of the method of Zska, P., et al., *Experientia*, **34**, 123 (1978).
Agglutination activity is expressed in µg per ml and is determined from serial dilutions in phosphate buffered saline, pH 6.8, of a 1 mg per ml solution. This activity is the lowest concentration to agglutinate a 2% suspension of appropriate human erythrocytes after 1 hr incubation at 25°C.
Potency: <16 µg per mL (using human blood group O erythrocytes.)
Protein approx. 50% by Lowry
Ref.: 1. Stirpe, F., et al., *Biochem. J.* **190**, 843 (1980)
2. Sehr, I. and Luther, P., *Lectins: Biology, Biochemistry, and Clinical Biochemistry*, Berlin (1983), 2, 45
Ref.: 2. Sehr, I., Luther, P., *Lectins: Biology, Biochemistry, and Clinical Biochemistry*, Berlin (1983), 2, 45
2. Stirpe, F., et al., *Biochem J.* **190**, 843 (1980)
Ft: 42143-76/77/78 S: 53-22-45-36/37/39

L 4141 [Lac]
Lectin 1 mg 62.25
from *Anguilla anguilla* (eel)
Lyophilized powder
Anguilla anguilla agglutinin (AAA) has anti-H blood group specificity. The lectin has an affinity for α-L-fucosyl residues.
Lyophilized powder containing NaCl
Purified by affinity chromatography
Agglutination activity is expressed in µg per ml and is determined from serial dilutions in phosphate buffered saline, pH 7.3, of a 1 mg per ml solution. The activity is the lowest concentration to agglutinate a 2% suspension of human blood group O erythrocytes after 1 hr incubation at 25 °C.
Potency: <20 µg per ml
Protein approx. 30% by Lowry
Ref.: 1. Horejší, V. and Kocourek, J. *Biochim Biophys. Acta* **536**, 299 (1978)
2. Kelly, C., *Biochem J.* **220**, 721 (1984)

L 2263 [Glc]
Lectin 1 mg 54.20
from *Limulus polyphemus*
Lyophilized powder
Agglutinates *Staphylococcus aureus* cells, as well as human and horse erythrocytes.
Major affinity is for N-acetylated D-hexosamines, but is reported to have anti-galactan specificity.[1]
Lyophilized powder containing Tris succinate, NaCl and calcium acetate
Purified by affinity chromatography.
Package size based on protein content
Agglutination activity is expressed in µg per ml and is determined from serial dilutions in phosphate buffered saline, pH 7.4, containing 0.1 mM $CaCl_2$, of a 1 mg per ml solution. This activity is the lowest concentration to agglutinate a 0.083% suspension of *S. aureus* cells.
Potency: <8 µg per mL (with *S. aureus* cells.)
Potency: <16 µg per ml (with blood group B erythrocytes)
Potency: <8 µg per mL (with *S. aureus* cells.)
Protein approx. 25% by modified Warburg-Christian
Ref.: Gibride, K.J. and Pistole, T.G., *Prog. Clin. Biol. Res.* **29**, 575 (1979)

Lectin
from *Arachis hypogaea* (peanut)
Peanut agglutinin, PNA
Peanut agglutinin (PNA) does not agglutinate normal human erythrocytes but strongly agglutinates neuraminidase treated erythrocytes. PNA has potent anti-T activity similar to the anti-T antibody in human sera. The lectin can be used to distinguish between human lymphocyte subsets.

Ref.: 1. Lotan, R., *J. Biol. Chem.* 250, 8518 (1975)
2. Lotan, J., *J. Immunol.* 121, 438 (1978)
3. Bird, G. W. G., *Vox Sang.* 9, 748 (1964)

L 0881	Lyophilized powder	5 mg	40.55
-one	Affinity-purified.	10 mg	71.65
	Agglutination activity is expressed in µg per ml and is determined from serial dilutions in phosphate buffered saline, pH 6.8, of a 1 mg per ml solution. This activity is the lowest concentration to agglutinate a 2% suspension of neuraminidase treated human blood group O erythrocytes after 1 hr incubation at 25 °C.	25 mg	156.75
	Potency: <0.1 µg per ml		
	salt		free

L 6646	**Lectin-Agarose macrobeads**	1 ml	89.20
3-PC	from *Arachis hypogaea* (peanut)		
	Saline suspension		
	Suspension in 1.0 M NaCl containing 0.01% thimerosal		
	Extent of labeling		2-4 mg per ml
	Matrix		6% agarose macrobeads
	Matrix activation		cyanogen bromide
	Matrix attachment		amino
	Matrix spacer		1 atom
	Binding capacity, asialofetuin (A 4781)		approx. 0.5 mg/ml

L 6135	**Lectin, Biotin labeled**	1 mg	27.85
3-PC	from *Arachis hypogaea* (peanut)	5 mg	85.70
	Lyophilized powder		
	Contains sodium citrate		
	Package size based on protein content.		
	Protein approx. 85% by Lowry		
	Extent of labeling		approx. 3 mol biotin per mol protein

L 7381	**Lectin, FITC labeled**	1 mg	32.15
-PC	from *Arachis hypogaea* (peanut)	2 mg	57.95
	Contains phosphate buffer salts and NaCl	5 mg	127.50
	Protein approx. 10% by Lowry		
	Extent of labeling		4-8 mol FITC per mol protein

L 7759	**Lectin, Peroxidase labeled**	250 µg	48.15
-PO	from *Arachis hypogaea* (peanut)	1 mg	123.85
	Lyophilized powder		
	Contains sodium citrate		
	Prepared from peroxidase (P 8375) using a modification of the method of O'Sullivan which favors low molecular weight conjugates. Repurified after conjugation by affinity chromatography.		
	Unit definition: One unit will form 1 mg purpurogallin in 20 sec from pyrogallol at pH 6.0 at 20°C.		
	Protein approx. 90% by modified Warburg-Christian		
	Ref.: O'Sullivan, M. J., A simple method for the preparation of enzyme-antibody conjugates. *FEBS Lett.* 95, 311 (1978)		

L 3766	**Lectin, TRITC labeled**	2 mg	134.50
-PO	from *Arachis hypogaea* (peanut)		
	Lyophilized powder		
	Contains phosphate buffer salts and NaCl		
	Protein approx. 10% by Lowry		
	Extent of labeling		1.5-3 mol TRITC per mol protein

Lectin-Agarose 1 ml 78.50

L 2507	from *Arachis hypogaea* (peanut)	2 ml	140.15
2-PC	Peanut agglutinin; PNA		
	Saline suspension		
	Peanut agglutinin (PNA) does not agglutinate normal human erythrocytes but strongly agglutinates neuraminidase treated erythrocytes. PNA has potent anti-T activity similar to the anti-T antibody in human sera. The lectin can be used to distinguish between human lymphocyte subsets.		
	Used for the purification of O-linked glycoproteins.		
	Suspension in 1.0 M NaCl containing 0.01% thimerosal		
	Extent of labeling		2-4 mg per ml
	Matrix		cross linked 4% beaded agarose
	Matrix activation		cyanogen bromide
	Matrix attachment		amino
	Matrix spacer		1 atom
	Binding capacity, asialofetuin		approx. 1.5 mg/ml
	Ref.: 1. Lotan, R., *J. Biol. Chem.* 250, 8518 (1975)		
	2. Lotan, J., *J. Immunol.* 121, 438 (1978)		
	3. Bird, G. W. G., *Vox Sang.* 9, 748 (1964)		
	Ref.: Shimoda, N., et al., *J. Biochem. Tokyo* 102, 657-664 (1987)		

Lectin
from *Artocarpus integrifolia*
Artocarpus integrifolia agglutinin; Jacalin
Ref.: 1. Sasy, M. V., Analysis of saccharide binding to Artocarpus integrifolia lectin reveals specific recognition of 1-anagen (beta-D-Gal(1→3)(D-GalNAc) *J. Biol. Chem.* 261, 11726 (1986)
2. Ahmed, H., Chatterjee, B.P., *J. Immunol. Meth.* (1986), 5,125
3. Roque-Barreira, M.C., Campos-Neto, A., Jacalin, An IgA-binding lectin *J. Immunol.* 134, 1740 (1985)

L 3515	Lyophilized powder	10 mg	55.00
3-PC	Contains phosphate buffer salts and NaCl	25 mg	121.00
	Purified by affinity chromatography.		
	Agglutination activity is expressed in µg per ml and is determined from serial dilutions in phosphate buffered saline, pH 6.8, of a 1mg per ml solution. This activity is the lowest concentration to agglutinate a 2% suspension of human blood group A erythrocytes after 1hour incubation at 25 °C.		
	Potency: <10 µg per ml		
	Protein approx. 70% by Biuret		

L 5147	**Lectin-Agarose**	2 ml	95.65
3-PC	from *Artocarpus integrifolia*	5 ml	190.60
	Saline suspension		
	Suspension in 1 M NaCl containing 0.01% thimerosal		
	Extent of labeling		approx. 5 mg per ml
	Sugar specificity		α-D-galactose
	Matrix		cross linked 4% beaded agarose
	Binding capacity, human IgA		1-2 mg/ml

L 4650	**Lectin, Peroxidase labeled**	1 mg	80.90
-PO	from *Artocarpus integrifolia*		
	Lyophilized powder		
	Contains sodium citrate		
	Prepared from Peroxidase (P 8375) using a modification of the method of O'Sullivan which favors low molecular weight conjugates. Repurified after conjugation by affinity chromatography.		
	Unit definition: One unit will form 1 mg purpurogallin in 20 sec from pyrogallol at pH 6.0 at 20°C.		
	Protein approx. 75% by modified Warburg-Christian		
	Ref.: O'Sullivan, M. J., A simple method for the preparation of enzyme-antibody conjugates. *FEBS Lett.* 95, 311 (1978)		

Lectin
from *Bandeiraea simplicifolia* (Griffonia simplicifolia)
Bandeiraea simplicifolia agglutinin, BS-1
BS-I is a tetrameric lectin consisting of two types of subunits designated A and B. There are five BS-I isolectins with different subunit compositions: BSI-B_4, BSI-AB_3, BSI-A_2B_2, BSI-A_3B and BSI-A_4. BSI-B_4 is blood group B specific and has an exclusive affinity for terminal α-D-galactosyl residues, whereas BSI-A_4 has blood group A specificity and has a major affinity for terminal N-acetyl-α-D-galactosaminyl residues.
Ref.: 1. Murphy, L. A., Goldstein, I. J., *J. Biol. Chem.* 252, 4739 (1977)
2. Hayes, C. E., Goldstein, I. J., *J. Biol. Chem.* 249, 1904 (1974)
3. Wood, C., *Arch. Biochem. Biophys.* 198, 1 (1979)

L 2380	Lyophilized powder	1 mg	25.35
3-PC	Purified by affinity chromatography using the method of Hayes, C.F. and Goldstein, I.J., *J. Biol. Chem.*, 249, 1904 (1974).	5 mg	75.65
	Agglutination activity is expressed in µg per ml and is determined from serial dilutions of a 1 mg per ml solution using phosphate buffered saline, pH 6.8, containing calcium, magnesium and manganese as indicated on the data sheet accompanying the product. This activity is the lowest concentration to agglutinate a 2% suspension of appropriate erythrocytes after 1hr incubation at 25 °C.		
	Potency: <20 µg per ml (using human blood group A or B erythrocytes.)		
	salt		free

L 3759	**Lectin, Biotin labeled**	1 mg	44.75
3-PC	from *Bandeiraea simplicifolia* (Griffonia simplicifolia)		
	Lyophilized powder		
	Contains sodium citrate		
	Protein approx. 85% by $E^{1\%}_{280}$		
	Extent of labeling		approx. 5 mol biotin per mol protein

L 9381	**Lectin, FITC labeled**	2 mg	57.90
-PC	from *Bandeiraea simplicifolia* (Griffonia simplicifolia)		
	Lyophilized powder		
	Contains phosphate buffer salts and NaCl		
	Protein approx. 10% by Lowry		
	Extent of labeling		1-2 mol FITC per mol protein

L 5264	**Lectin, TRITC labeled**	2 mg	57.90
-PO	from *Bandeiraea simplicifolia* (Griffonia simplicifolia)		
	Contains phosphate buffer salts and NaCl		
	Lyophilized powder		
	Protein approx. 10% by Lowry		
	Extent of labeling		approx. 3 mol TRITC per mol protein

L 3019	**Isolectin B_4 (BSI-B_4)**	1 mg	126.85
-PC	from *Bandeiraea simplicifolia* (Griffonia simplicifolia)		
	Lyophilized powder		
	Highly purified.		
	Contains sodium citrate		
	Agglutination activity is expressed in µg per ml and is determined from serial dilutions of a 1 mg per ml solution using phosphate buffered saline, pH 6.8, containing calcium, magnesium and manganese as indicated on the data sheet accompanying the product. This activity is the lowest concentration to agglutinate a 2% suspension of appropriate erythrocytes after 1 hr incubation at 25°C.		
	Potency: <8 µg per ml (using human blood group B erythrocytes. Does not agglutinate blood group A erythrocytes at 125 µg per ml)		
	Protein approx. 95% by $E^{1\%}_{280}$		

L 2140	**Isolectin B_4, Biotin labeled**	200 µg	43.95
-PC	from *Bandeiraea simplicifolia* (Griffonia simplicifolia)	1 mg	145.85
	Lyophilized powder		
	Contains citrate buffer salts and $CaCl_2$		
	Protein approx. 95%		
	Extent of labeling		2-4 mol biotin per mol isolectin B_4

L 2895	**Isolectin B_4, FITC labeled**	200 µg	55.80
3-PC	from *Bandeiraea simplicifolia* (Griffonia simplicifolia)	1 mg	185.75
	Contains Sodium citrate as balance		
	Protein minimum 70% by Lowry		
	Extent of labeling		approx. 2 mol FITC per mol protein

L 5391	**Isolectin B_4, Peroxidase labeled**	200 µg	76.35
-PO	from *Bandeiraea simplicifolia* (Griffonia simplicifolia)	500 µg	157.35
	Lyophilized powder		
	Contains sodium citrate buffer salts and calcium chloride		
	Prepared from peroxidase type VI using a modification of the method of O'Sullivan, et al. Repurified by affinity chromatography after conjugation		
	Unit definition: One unit will form 1 mg purpurogallin in 20 sec from pyrogallol at pH 6.0 at 20°C.		
	Protein approx. 95% by modified Warburg-Christian		
	Ref.: O'Sullivan, M. J., A simple method for the preparation of enzyme-antibody conjugates. *FEBS Lett.* 95, 311 (1978)		

L 1509	**Isolectin A_4 (BSI-A_4)**	1 mg	128.80
-PC	from *Bandeiraea simplicifolia* (Griffonia simplicifolia)		
	Lyophilized powder		
	Highly purified.		
	Contains sodium citrate		
	Agglutination activity is expressed in µg per ml and is determined from serial dilutions of a 1mg per ml solution using phosphate buffered saline, pH6.8, containing calcium, magnesium and manganese as indicated on the data sheet accompanying the product. This activity is the lowest concentration to agglutinate a 2% suspension of appropriate erythrocytes after 1hr incubation at 25°C.		
	Potency: <16 µg per ml (with human blood group A erythrocytes)		
	Potency: >32 µg per ml (with human blood group B erythrocytes)		
	Protein approx. 95% by $E^{1\%}_{280}$		

L 0890	**Isolectin A_4, FITC labeled**	200 µg	47.55
-PC	from *Bandeiraea simplicifolia* (Griffonia simplicifolia)	1 mg	159.15
	Lyophilized powder		
	Contains citrate buffer salts and $CaCl_2$		
	Protein approx. 95% by $E^{1\%}_{280}$		
	Extent of labeling		2-4 mol FITC per mol isolectin A_4

Lectin 5 mg 75.35

L 6013	from *Bauhinia purpurea* (camels foot tree)		
-PO	BPA; Bauhinia purpurea agglutinin		
	Lyophilized powder		
	Bauhinia purpurea agglutinin (BPA). Extracts of *B. purpurea* seeds are reported to contain an anti-N blood group specific lectin, but after purification BPA is not blood group specific. BPA has an affinity for N-acetyl-D-galactosamine and D-galactose.		
	Purified by affinity chromatography using the method of: Osawa, T., et al., *Methods in Enzymology*, 50, 367 (1978)		

US $ (Continuation of)

Lectin

Agglutination activity is expressed in µg per mL and is determined from serial dilutions in phosphate buffered saline, pH 7.2, of a 1 mg per ml solution. This activity is the lowest concentration to agglutinate a 2% suspension of human erythrocytes after 1 hr incubation at 25°C.
Potency: <8 µg per mL
salt ..... essentially free
Ref.: 1. Ozawa, T., *Meth. Enzymol.* **50**, 367 (1978)
2. Mäkelä, O., Mäkelä, P., *Ann. Med. Exp. Fenn.* **34**, 402 (1956)

Lectin, Biotin labeled 1 mg 203.05

L 9537 [3-PC] **from Caragana arborescens (Siberian pea tree)**
CAA; Caragana arborescens agglutinin
Lyophilized powder
CAA is not blood group specific, but has affinity for N-acetyl-D-galactosamine.
Contains sodium citrate
Protein approx. 85% by $E^{1\%}_{280}$ 33.3
Extent of labeling ..... 3-6 mol biotin per mol protein
Ref.: Bloch, R., *J. Biol. Chem.* **251**, 5629 (1976)

Lectin 500 µg 27.75

L 2638 [3-PC] **from Codium fragile (green marine algae)** 1 mg 48.75 / 5 mg 187.55
Lyophilized powder
Codium fragile, subspecies tomentosoides, agglutinin is not blood group specific, but has an affinity for N-acetyl-D-galatosamine.
Purified by affinity chromatography.
Potency: <2 µg per ml
salt ..... essentially free
Ref.: Rogers, D. J., *Lectins: Biology, Biochemistry, Clinical Biochemistry* (1985). **5**, 155

Lectin
from Dolichos biflorus (horse gram)
Ref.: 1. Etzler, M. E., Kabat, E. A., *Biochemistry* **9**, 869 (1970)
2. Bird, G. W. G., *Biol.* **21**, 366 (1970)
3. Etzler, M. E., *Meth. Enzymol.* **28**, 340 (1972)

L 2785 [3-PC] Lyophilized powder 1 mg 22.10
Purified by affinity chromatography. 5 mg 59.15
Agglutination activity is expressed in µg per ml and is determined from serial dilutions in phosphate buffered saline, pH 6.8, of a 1 mg per ml solution.
This activity is the lowest concentration to agglutinate a 2% suspension of human blood group A_1 erythrocytes after 1 hr incubation at 25°C.
Potency: <20 µg per mL
salt ..... essentially free

L 9894 [3-PC] **Lectin–Agarose** 1 ml 57.60
from Dolichos biflorus (horse gram)
Buffered aqueous suspension
Suspension in 0.01 M potassium phosphate, pH 6.8, 0.5 M NaCl, and 0.02% sodium azide
Extent of labeling ..... 2-4 mg protein (Lowry) per mL
Matrix ..... 4% beaded agarose

L 6533 [3-PC] **Lectin, Biotin labeled** 1 mg 38.30 / 5 mg 144.00
from Dolichos biflorus (horse gram)
Lyophilized powder
Contains HEPES buffer salts and NaCl
Protein approx. 25% by Biuret
Extent of labeling ..... 6-10 mol biotin per mol protein

L 9142 [3-PC] **Lectin, FITC labeled** 1 mg 58.05
from Dolichos biflorus (horse gram)
Lyophilized powder
Purified, essentially salt-free
May contain residual Tris-succinate buffer salts.
Extent of labeling ..... 3-8 mol FITC per mol protein

L 1287 [3-PC] **Lectin, Peroxidase labeled** 250 µg 32.15
from Dolichos biflorus (horse gram)
Lyophilized powder
Contains sodium citrate
Prepared from peroxidase type VI using a modification of the method of O'Sullivan, M.J., et al., *FEBS Lett.* **95**, 311 (1978), which favors low molecular weight conjugates
Unit definition: One unit will form 1 mg purpurogallin in 20 sec from pyrogallol at pH 6.0 at 20°C.
Protein approx. 90% by Biuret

L 9658 [3-PC] **Lectin, TRITC labeled** 2 mg 99.10
from Dolichos biflorus (horse gram)
Lyophilized powder
Contains phosphate buffer salts and NaCl
Protein approx. 15% by Lowry
Extent of labeling ..... 1-3 mol TRITC per mol protein

L 7762 [3-PC] **Lyophilized powder** 1 vial 11.65
vial of 5 ml

Lectin 1 mg 43.45

L 2142 [3-PC] **from Erythrina corallodendron (coral tree)**
Lyophilized powder
Erythrina corallodendron agglutinin (ECorA) is not blood group specific, but has an affinity for N-acetyllactosamine, N-acetyl-D-galactosamine, lactose and D-galactose.[1,2] It is reported to exhibit mitogenic activity for human peripheral blood lymphocytes (predominantly T cells).[1,2]

Purified by affinity chromatography.
Agglutination activity is expressed in µg per ml and is determined from serial dilutions in phosphate buffered saline, pH 7.2, of a 1 mg per ml solution.
This activity is the lowest concentration to agglutinate a 2% suspension of human erythrocytes
Potency: <10 µg per ml
salt ..... free
Ref.: 1. Liu, H., *Phytochemistry* **24**, 2803 (1985)
2. Gilboa-Garber, N., Mirabelli, T., *Can. J. Biochem.* **50**, 315 (1931)

Lectin 5 mg 106.80

L 5390 [3-PC] **from Erythrina cristagalli (coral tree)** 10 mg 192.45
Lyophilized powder
Purified by affinity chromatography.
Agglutination activity is expressed in µg per ml and is determined from serial dilutions in phosphate buffered saline, pH 6.8, of a 1 mg per ml solution.
This activity is the lowest concentration to agglutinate a 2% suspension of trypsinized human blood group O erythrocytes after 1 hr at 25°C.
Potency: <0.5 µg per ml
salt ..... free
Ref.: Iglesias, J. I., *Eur. J. Biochem.* **123**, 247 (1982)

Lectin
from Galanthus nivalis (snowdrop)
Galanthus nivalis lectin (GNL) agglutinates rabbit erythrocytes; human erythrocytes are not agglutinated.[1] GNL sugar specificity is directed to the nonreducing end of the terminal α-D-mannosyl residue of glycoconjugates[2].

Ref.: 1. Shibuya, N., *Arch. Biochem. Biophys.* **267**, 676 (1988)
2. Kaku, H., Goldstein, I. J., *Meth. Enzymol.* **179**, 377 (1989)

L 8275 [3-PC] **Lyophilized powder** 5 mg 67.35
Purified by affinity chromatography according to Kaku, H. and Goldstein, I.J., *Methods in Enzymol.*, 179, 327 (1989).
Agglutination activity is expressed in µg per ml and is determined from serial dilution in phosphate buffered saline, pH 7.2 of a 1 mg per ml solution.
This activity is the lowest concentration to agglutinate a 2% suspension of rabbit erythrocytes after 1 hr incubation at 25°C.
Potency: <20 µg per mL
salt ..... essentially free

L 8775 [3-PC] **Lectin–Agarose** 2 mL 86.30
from Galanthus nivalis (snowdrop)
Saline suspension
Suspension in 1.0 M NaCl containing 0.01% thimerosal
Extent of labeling ..... 2-4 mg protein per mL
Matrix ..... cross-linked 4% beaded agarose
Binding capacity, yeast mannan: 5-10 mg/mL (pH 7.2 at 25°C)

Lectin
from *Glycine max* (soybean)
Glycine max agglutinin (SBA) is not blood group specific but has an affinity for N-acetyl-D-galactosamine.
Conjugates are prepared from affinity purified lectin.
Agglutination activity is expressed in µg per mL and is determined from serial dilutions in phosphate buffered saline, pH 6.8, of a 1 mg per ml solution. This activity is the lowest concentration to agglutinate a 2% suspension of human blood group A erythrocytes after 1 hr incubation at 25 °C.
Ref.: 1. Lotan, R., *J. Biol. Chem.* **249**, 1219 (1974)
2. Lis, H., *Biochim. Biophys. Acta* **211**, 582 (1970)

L 1395 [3-PC] **Lyophilized powder** 5 mg 52.35
Purified by affinity chromatography. 25 mg 207.05
Potency: <80 µg per ml
salt ..... essentially free

L 1145 [3-PC] **Lectin–agarose** 1 mL 48.10
from *Glycine max* (soybean) 2 mL 84.05
PBS suspension
Suspension in 0.01 M phosphate buffered saline containing 50% glycerol, 0.01 M N-acetyl-D-galactosamine and 0.02% sodium azide
Extent of labeling ..... 2-4 mg protein (Bicinch per mL
Matrix ..... cross-linked 4% beaded agarose
Matrix spacer ..... 20 atoms

L 2690 [3-PC] **Lectin, Peroxidase labeled** 1 mg 73.00
from *Glycine max* (soybean)
Lyophilized powder
Contains sodium citrate
Prepared from peroxidase type VI using a modification of the method of O'Sullivan, et al., *FEBS Lett.*, **95**, 311 (1978), which favors low molecular weight conjugates. Repurified after conjugation by affinity chromatography.
Unit definition: One unit will form 1 mg purpurogallin in 20 sec from pyrogallol at pH 6.0, at 20°C.
Protein approx. 95% by modified Warburg-Christian

L 4511 [3-PC] **Lectin, TRITC labeled** 2 mg 56.20
from *Glycine max* (soybean)
Lyophilized powder
Contains phosphate buffer salts and NaCl
Protein approx. 10% by Lowry
Extent of labeling ..... approx. 1 mol TRITC per mol protein

Lectin US $
from *Lens culinaris* (lentil)
Lens culinaris agglutinin (LcH) is not blood group specific. It has an affinity for terminal α-D-mannosyl and α-D-glucosyl residues. LcH is comprised of two isomers, LcH-A (mol. wt. 49,000) and LcH-B (mol. wt. 49,000). LcH-A is tetrameric. Conjugates are prepared from purified lectin.

Sugar specificity: α-D-mannose
Ref.: Howard, L. K., *J. Biol. Chem.* **246**, 1590 (1971)

L 9267 [3-PC] **Lyophilized powder** 5 mg 127.65
Purified by affinity chromatography. 25 mg 425.50 / 100 mg 1181.90
Contains two major bands on electrophoresis corresponding to isoforms LcH-A and LcH-B.
Agglutination activity is expressed in µg per ml and is determined from serial dilutions in phosphate buffered saline, pH 6.8, of a 1 mg per ml solution. This activity is the lowest concentration to agglutinate a 2% suspension of human erythrocytes after 1 hr incubation at 25°C.
Highly Purified
Potency: <16 µg per mL
salt ..... free

L 1277 [3-PC] pI ..... (1) 8.2, (2) 8.6, (3) 8.8 1 vial 15.50
vial of approx. 1 mg protein

L 4018 [3-PC] **Lectin–Agarose** 1 mL 40.00
from *Lens culinaris* (lentil) 5 mL 132.60
Saline suspension
Sugar specificity: α-D-mannose
Suspension in 0.9% NaCl, 1 mM $CaCl_2$, 1 mM $MnCl_2$ containing 0.01% thimerosal
Extent of labeling ..... approx. 2 mg per mL
Matrix ..... 4% beaded agarose
Matrix activation ..... cyanogen bromide
Matrix spacer ..... 1 atom

L 0511 [3-PC] **Lectin–Agarose** 5 mL 211.35
from *Lens culinaris* (lentil) 10 mL 352.30
Aqueous ethanol suspension 75 ml 704.55
Suspension in 20% ethanol containing 0.9% NaCl, 1 mM $CaCl_2$, 1 mM $MnCl_2$ and 0.01% thimerosal
Extent of labeling ..... approx. 2 mg per mL
Matrix ..... Sepharose 4B
Binding capacity, porcine thyroglobulin ..... 15 mg/mL

L 4143 [3-PC] **Lectin–Biotin labeled** 1 mg 26.50
from *Lens culinaris* (lentil)
Lyophilized powder (containing sodium citrate)
Package size based on protein content.
Protein approx. 85% by Lowry
Extent of labeling ..... 2-5 mol biotin per mol lectin

L 9262 [3-PC] **Lectin, FITC labeled** 1 mg 17.75
from *Lens culinaris* (lentil) 5 mg 45.90
Lyophilized powder (containing HEPES buffer salts and sodium chloride.)
Package size based on protein content
Protein approx. 40% by Lowry
Extent of labeling ..... approx. 2 mol FITC per mol protein

US $

L 2886 — Lectin — 1 mg 42.40; 5 mg 166.90
from *Lycopersicon esculentum* (tomato)
Lyophilized powder
Lycopersicon esculentum agglutinin (LEA) is not blood group specific, but has an affinity for *N*-acetyl-β-D-glucosamine oligomers. The lectin is a glycoprotein containing approx. equal amounts of protein and carbohydrate and is reported to inhibit the mitogenic activity of phytohemagglutinin (from *Phaseolus vulgaris*).
Contains NaCl
Purified by affinity chromatography.
Agglutination activity is expressed in µg per ml and is determined from serial dilutions in phosphate buffered saline, pH 7.3, of a 1 mg per ml solution. This activity is the lowest concentration to agglutinate a 2% suspension of human erythrocytes after 1 hr incubation at 25 °C.
Potency: <2 µg per mL
Lectin minimum 40%

Lectin
from *Lycopersicon esculentum* (tomato)
Lycopersicon esculentum agglutinin (LEA) is not blood group specific, but has an affinity for *N*-acetyl-β-D-glucosamine oligomers. The lectin is a glycoprotein containing approx. equal amounts of protein and carbohydrate and is reported to inhibit the mitogenic activity of phytohemagglutinin (from *Phaseolus vulgaris*).
Agglutination activity is expressed in µg per ml and is determined from serial dilutions in phosphate buffered saline, pH 7.3, of a 1 mg per ml solution. This activity is the lowest concentration to agglutinate a 2% suspension of human erythrocytes after 1 hr incubation at 25 °C.

L 0651 — Lectin, Biotin labeled — 1 mg 56.05; 2 mg 100.90
from *Lycopersicon esculentum* (tomato)
Lyophilized powder
Contains NaCl
Lectin approx. 25%
Extent of labeling . . . . . 3-5 mol biotin per mol lectin

L 0401 — Lectin, FITC labeled — 1 mg 85.80
from *Lycopersicon esculentum* (tomato)
Buffered aqueous solution
Solution in 10 mM HEPES, 0.15 M NaCl, pH 7.5, containing 0.1 mM Ca^{2+} and 0.08% sodium azide
Package size based on protein content.
Extent of labeling . . . . . 3-6 mol FITC per mol lectin

Lectin
from *Maclura pomifera* (Osage orange)
Maclura pomifera agglutinin (MPA) does not have human blood group specificity, but is reported to bind specifically to T lymphocytes. MPA has an affinity for terminal α-D-galactosyl and *N*-acetyl-D-galactosaminyl residues.

L 6141 — Lyophilized powder — 1 mg 30.60
Purified by affinity chromatography by the method of Bausch, N.J. and Poretz, R.D., Biochemistry, 16, 5793 (1977).
Agglutination activity is expressed in µg per ml and is determined from serial dilutions in phosphate buffered saline, pH 6.8, of a 1 mg per ml solution. This activity is the lowest concentration to agglutinate a 2% suspension of human erythrocytes after 1 hr incubation at 25 °C.
Potency: <1 µg per mL
salt . . . . . free

L 2013 — Lectin, Biotin labeled — 1 mg 77.00
from *Maclura pomifera* (Osage orange)
Lyophilized powder
Contains sodium citrate
Package size based on protein content.
Agglutination activity is expressed in µg per ml and is determined from serial dilutions in phosphate buffered saline, pH 6.8, of a 1 mg per ml solution. This activity is the lowest concentration to agglutinate a 2% suspension of human erythrocytes after 1 hr incubation at 25°C.
Protein approx. 85% by $E^{1\%}_{280}$
Extent of labeling . . . . approx. 2 mol biotin per mol protein

L 4401 — Lectin, Peroxidase labeled — 1 mg 130.50
from *Maclura pomifera* (Osage orange)
Lyophilized powder
Contains sodium citrate
Prepared from peroxidase TypeVI using a modification of the method of O'Sullivan, M.J.; et al., FEBS Lett., 95, 313 (1978), which favors low molecular weight conjugates. Repurified by affinity chromatography after conjugation.
Package size based on protein content.
Unit definition: One unit will form 1 mg purpurogallin from pyrogallol in 20 sec at pH 6.0 at 20°C.
Agglutination activity is expressed in µg per ml and is determined from serial dilutions in phosphate buffered saline, pH 6.8, of a 1 mg per ml solution. This activity is the lowest concentration to agglutinate a 2% suspension of human erythrocytes after 1 hr incubation at 25°C.
Protein approx. 90% by modified Warburg-Christian

Lectin
from *Phaseolus vulgaris* (red kidney bean)
Phaseolus vulgaris agglutinin; PHA
Phaseolus vulgaris agglutinin (PHA) consists of two molecular species, an erythroagglutinin (PHA-E) which has low mitogenic activity and high erythroagglutinin activity, and leucoagglutinin (PHA-L) which has high mitogenic and leucoagglutinating activity, but very low erythroagglutinating activity. PHA-E is not blood group specific, but agglutination can be inhibited by certain oligosaccharides. PHA-P is the protein form of PHA prior to separation and purification of erythroagglutinin and leucoagglutinin. PHA-M is the mucoprotein form. Erythroagglutinin, leucoagglutinin, and phytohemagglutinin conjugates are prepared from the corresponding purified lectins L8523, L2769, and L9017.

L 8629 — Erythroagglutinin PHA-E — 5 mg 19.60
Salt-free, lyophilized powder
Tested for leucoagglutination.
Purified by a modification of the method of Leavitt, R.D., et al., J. Biol. Chem., 252, 2951 (1977).
Agglutination activity is expressed in µg per ml and is determined from serial dilutions of a 1mg per ml solution. This activity is the lowest concentration to agglutinate a suspension of either human erythrocytes (2% in phosphate buffered saline, pH6.8) or human leukocytes (10^7 per ml in saline) after 1hr incubation at 25°C. Mitogenic activity is determined by ^{3}H-thymidine incorporation in lymphocyte cultures.
Potency: <10 µg per mL (with erythrocytes)

L 6139 — Erythroagglutinin PHA-E, TRITC labeled — 1 mg 31.45
from *Phaseolus vulgaris* (red kidney bean)
Lyophilized powder
Contains phosphate buffer salts and NaCl
Package size based on protein content.
Protein approx. 10% by Lowry
Extent of labeling . . . approx. 1 mol TRITC per mol protein

L 2769 — Leucoagglutinin PHA-L — 2 mg 40.35; 5 mg 88.45; 10 mg 159.25
Lyophilized powder
Purified.
Purified by a modification of the method of Leavitt, R.D., et al., J. Biol. Chem., 252, 2951 (1977).
Tested for leucoagglutination. Does not agglutinate erythrocytes at 250 µg per ml. Mitogenic at <5 µg per ml.
salt . . . . . free

L 3007 — Lectin–Agarose — 1 mL 77.20; 2 mL 128.35
from *Phaseolus vulgaris* (red kidney bean)
Saline suspension
Suspension in 1.0 M NaCl
Extent of labeling . . . . . 2-4 mg per mL
Matrix . . . . . cross-linked 4% beaded agarose

L 9017 — Phytohemagglutinin — 1 mg 22.95; 5 mg 83.45; 10 mg 149.70
from *Phaseolus vulgaris* (red kidney bean)
Lectin from *Phaseolus vulgaris* (red kidney bean) Phytohemagglutinin PHA-P
Lyophilized powder
Mitogenic activity at <10 µg per mL
Affinity purified.
Agglutination activity is expressed in µg per ml and is determined from serial dilutions of a 1mg per ml solution. This activity is the lowest concentration to agglutinate a suspension of either human erythrocytes (2% in phosphate buffered saline, pH6.8) or human leukocytes (10^7 per ml in saline) after 1hr incubation at 25°C. Mitogenic activity is determined by ^{3}H-thymidine incorporation in lymphocyte cultures.
Potency: <15 µg per ml (with erythrocytes)
salt . . . . . essential, free
S: 22-24/25

L 9132 — Phytohemagglutinin PHA-P — 5 mg 25.55
from *Phaseolus vulgaris* (red kidney bean)
Lyophilized powder, cell culture tested
Agglutination activity: ≤16 µg per mL (with erythrocytes)
Potency: ≤10 µg per ml (Mitogenic)
salt . . . . . free
Solubility
PBS . . . . . 5 mg/mL
S: 22-24/25

L 8754 — Phytohemagglutinin PHA-P — 5 mg 12.55; 25 mg 35.85; 50 mg 56.50
from *Phaseolus vulgaris* (red kidney bean)
Lyophilized powder
Mitogenic at <10 µg per mL
Agglutination activity is expressed in µg per ml and is determined from serial dilutions of a 1mg per ml solution. This activity is the lowest concentration to agglutinate a suspension of either human erythrocytes (2% in phosphate buffered saline, pH6.8) or human leukocytes (10^7 per ml in saline) after 1hr incubation at 25°C. Mitogenic activity is determined by ^{3}H-thymidine incorporation in lymphocyte cultures.
Potency: <16 µg per mL (with erythrocytes.)
salt . . . . . free
S: 22-24/25

L 2646 — Phytoagglutinin PHA-M — 10 mg 21.70; 25 mg 36.60; 100 mg 118.10
from *Phaseolus vulgaris* (red kidney bean)
Lyophilized powder
Mitogenic at <10 µg per mL
Agglutination activity is expressed in µg per ml and is determined from serial dilutions of a 1mg per ml solution. This activity is the lowest concentration to agglutinate a suspension of either human erythrocytes (2% in phosphate buffered saline, pH 6.8) or human leukocytes (10^7 per ml in saline) after 1 hr incubation at 25 °C. Mitogenic activity is determined by ^{3}H-thymidine incorporation in lymphocyte cultures.
Potency: <40 µg per mL (with erythrocytes.)
salt . . . . . free
S: 22-24/25

L 8902 — Phytohemagglutinin PHA-M — 5 mg 26.60; 25 mg 40.90; 100 mg 128.50
from *Phaseolus vulgaris* (red kidney bean)
Lyophilized powder, cell culture tested
Mitogenic activity: <10 µg per mL
salt . . . . . free
Solubility
PBS . . . . . 2 mg/ml
S: 22-24/25

L 4144 — Leucoagglutinin PHA-L — 5 mg 132.30
from *Phaseolus vulgaris* (red kidney bean)
Lyophilized powder, cell culture tested, leucocyte agglutination activity tested
Purified.
Mitogenic concentration: <5 µg per mL
salt . . . . . free
Endotoxin . . . . . tested
Solubility
PBS . . . . . 5 mg/mL
S: 22-24/25

Lectin
from *Phaseolus coccineus* (Scarlet Runner Bean)
Phaseolus coccineus agglutinin (PCA) is not blood group specific. Agglutination is not inhibited by monosaccharides but is inhibited by fetuin.

L 3138 — Lyophilized powder — 1 mg 25.40
Mitogenic at <10 µg per ml.
Contains NaCl
Affinity purified.
Agglutination activity is expressed in µg/ml and is determined from serial dilutions in phosphate buffered saline, pH 6.8, of 1 mg/ml solution. This activity is the lowest concentration to agglutinate a 2% suspension of human erythrocytes after 1 hr incubation at 25 °C.
Mitogenic activity is determined by ^{3}H-thymidine incorporation in lymphocyte cultures.
Potency: <8 µg per mL
Glycoprotein carbohydrate approx. 10%
Protein approx. 75% by Biuret

US $ (Continuation of) **Lectin**

L 4389 [5-FC] **Lectin, TRITC labeled** 5 mg 149.80
from *Phaseolus coccineus* (Scarlet Runner Bean)
Lyophilized powder
Contains phosphate buffer salts and NaCl
Package size based on protein content.
Agglutination activity is expressed in µg/ml and is determined from serial dilutions in phosphate buffered saline, pH 6.8, of 1 mg/ml solution. This activity is the lowest concentration to agglutinate a 2% suspension of human erythrocytes after 1 hr incubation at 25°C.
Mitogenic activity is determined by ^{3}H-thymidine incorporation in lymphocyte cultures.[2]
Protein approx. 10% by Lowry
Extent of labeling ..... 1-2 mol TRITC per mol protein

Lectin
from Phytolacca americana **(pokeweed)**
Pokeweed mitogen; PWM
PWM has hemagglutinating, leukoagglutinating and mitogenic properties. PWM is not blood group specific, but has affinity for N-acetyl-β-D-glucosamine oligomers.
Ref.: Yoshiyama, K., et al., Biochim. Biophys. Acta 533, 334 (1978)
R: 43 S: 26-36

L 9375 [5-FC] **Lectin** 5 mg 43.05
from *Phytolacca americana* 10 mg 71.55
(pokeweed) 40 mg 231.55
Lyophilized powder
[63231-57-2]
Partially purified.
Mitogenic at approx. 2.5 µg per ml.
Lyophilized TCA precipitate
Agglutination activity is expressed in µg per ml and is determined from serial dilutions in phosphate buffered saline, pH 6.8, of a 1 mg per ml solution. This activity is the lowest concentration to agglutinate a 2% suspension of human blood group A erythrocytes after 1 hr incubation at 25 °C. Mitogenic activity was determined by ^{3}H-thymidine incorporation in lymphocyte cultures.
aseptically filled
Potency: <20 µg per ml

L 8777 [5-FC] **Lectin** 5 mg 42.75
from *Phytolacca americana* 10 mg 67.50
(pokeweed)
Lyophilized powder, cell culture tested
[63231-57-2]
Partially purified TCA precipitate.
Essentially salt-free.
aseptically filled
Agglutination activity: <20 µg per ml
Mitogenic activity: approx. 2.5 µg per ml
salt ..... essentially free
Solubility
PBS ..... 1 mg/ml

L 2882 [5-FC] **Lectin–Agarose** 1 mL 43.90
from *Phytolacca americana* (pokeweed)
Saline suspension
Suspension in 1.0 M NaCl
Extent of labeling ..... 1-3 mg per mL
Matrix ..... cross-linked 4% beaded agarose
Matrix activation ..... cyanogen bromide
Matrix attachment ..... amino
Matrix spacer ..... 1 atom

Lectin
from Pisum sativum **(pea)**
Pisum sativum agglutin (PSA) is not blood group specific, but has an affinity for terminal α-D-mannosyl residues. PSA lectin is a mitogen similar to concanavalin A.
Conjugates are prepared from affinity purified lectin.
Agglutination activity is expressed in µg per ml and is determined from serial dilutions in phosphate buffered saline, pH 6.8, of a 1 mg per ml solution. This activity is the lowest concentration to agglutinate a 2% suspension of human erythrocytes after 1 hr incubation at 25°C
salt ..... low
Ref.: Tomlinson, I.S., J. Biol. Chem. 249, 6004 (1974)
R: 42/43 S: 36

L 5380 [5-FC] **Lyophilized powder** 5 mg 56.00
Purified by affinity chromatography.
Potency: <20 µg per ml

L 0770 [5-FC] **Lectin, FITC labeled** 2 mg 59.75
from *Pisum sativum* (pea)
Lyophilized powder
Extent of labeling ... 2-4 mol FITC per mol protein (low)

Lectin
from *Psophocarpus tetragonolobus* (winged bean)
Psophocarpus tetragonolobus agglutinin is not blood group specific, but has an affinity for N-acetyl-D-galactosamine.
Package size based on protein content

L 2138 [5-FC] **Lyophilized powder** 1 mg 26.30
Contains phosphate buffer salts and NaCl 5 mg 99.80
Agglutination activity is expressed in µg per ml and is determined from serial dilutions in phosphate buffered saline, pH 6.8, of a 1 mg per ml solution.
This activity is the lowest concentration to agglutinate a 2% suspension of human erythrocytes after 1 hr incubation at 25°C.
Potency: <30 µg per mL
Protein approx. 65% by Biuret

L 3014 [5-FC] **Lectin, Biotin labeled** 1 mg 50.75
from *Psophocarpus tetragonolobus* (winged bean)
Lyophilized powder
Contains sodium citrate
Agglutination activity is expressed in µg per ml and is determined from serial dilutions in phosphate buffered saline, pH 6.8, of a 1 mg per ml solution.
This activity is the lowest concentration to agglutinate a 2% suspension of human erythrocytes after 1 hr. incubation at 25°C.
Protein approx. 85% by $E^{1\%}_{280}$
Extent of labeling .... approx. 3 mol biotin per mol protein

L 3264 [5-FC] **Lectin, FITC labeled** 2 mg 102.00
from *Psophocarpus tetragonolobus* (winged bean)
Lyophilized powder
Contains phosphate buffer salts and NaCl
Agglutination activity is expressed in µg per ml and is determined from serial dilutions in phosphate buffered saline, pH 6.8, of a 1 mg per ml solution.
This activity is the lowest concentration to agglutinate a 2% suspension of human erythrocytes after 1 hr incubation at 25 °C.
Protein approx. 10% by Biuret
Extent of labeling .. approx. 3 mol FITC per mol protein

L 3139 [5-FC] **Lectin, Peroxidase labeled** 500 µg 66.05
from *Psophocarpus tetragonolobus* (winged bean)
Lyophilized powder
Contains phosphate buffer salts and NaCl
Unit definition: One unit will form 1 mg purpurogallin in 20 sec from pyrogallol at pH 6.0 at 20°C.
Agglutination activity is expressed in µg per ml and is determined from serial dilutions in phosphate buffered saline, pH 6.8, of a 1 mg per ml solution.
This activity is the lowest concentration to agglutinate a 2% suspension of human erythrocytes after 1 hr incubation at 25°C.
Protein approx. 10% by modified Warburg-Christian

Lectin
from *Ricinus communis* (castor bean)
Ricinus communis agglutinin (RCA) occurs in two forms designated RCA_{60} and RCA_{120} according to their mol. wt. of approx. 60,000 and 120,000 respectively.[1] Neither RCA_{60} nor RCA_{120} is blood group specific. RCA_{60}, also referred to as RCA_I,[2] Ricin D[3] or RCL III[4] is extremely toxic, inhibits protein synthesis and has an affinity for N-acetyl-D-galactosamine. RCA_{120}, also referred to as RCA_{II}[2] or RCL I + II[4] is an agglutinin and has an affinity for terminal β-D-galactosyl residues.[3]
Conjugates are prepared from affinity purified toxin, RCA_{60} or agglutinin RCA_{120}.
WARNING: Extremely hazardous! Be aware of the risks and familiar with safety procedures before you use this product.
Ref.: 1. Nicholson, G.L., et al., Biochemistry 13, 196 (1974)
2. Ui, T.S., U, S.L., Eur. J. Biochem. 105, 453 (1980)
3. Nicholson, G.L., Blanstein, J., Biochim. Biophys. Acta 266, 543 (1972)
4. Wei, C.H., Koh, C., J. Mol. Biol. 123, 709 (1978)

L 5514 [5-FC] **Ricin, A chain** 1 mg 71.25
from *Ricinus communis* (castor bean) 5 mg 235.60
Buffered aqueous glycerol solution
Solution in 40% glycerol containing 10 mM phosphate, pH 6.0, 0.15 M NaCl, 10 mM galactose and 0.5 mM dithioerythritol
Purified by affinity chromatography.
Electrophoretically pure (SDS-PAGE)
R: 42/43-26/27/28 S: 53-23-45-36/37/39

L 6022 [5-FC] **Lectin Ricin, A chain, deglycosylated** 1 mg 101.40
from *Ricinus communis* (castor bean)
Buffered aqueous glycerol solution
The carbohydrate moiety of Ricin A chain has been modified using a metaperiodate-cyanoborohydride mixture. The product still inhibits protein synthesis in cell-free systems, and its removal from the blood stream by the liver is markedly decreased. Immunotoxins prepared from deglycosylated Ricin A chain will therefore be more effective in killing target cells.
Solution in 40% glycerol containing 10 mM phosphate, pH 6.0, 0.15 M NaCl, 10 mM galactose and 0.5 mM dithioerythritol
Ref.: 1. Thorpe, P.E., et al., Eur. J. Biochem. 147, 197 (1985)
2. Sullivan, D.M., et al., Biochim. Biophys. Acta 842, 12 (1985)
3. Thorpe, P.E., et al., Cancer Res. 48, 6396 (1988)

L 8639 [5-FC] **Ricin, B chain** 1 mg 56.90
from *Ricinus communis* (castor bean) 5 mg 215.20
Buffered aqueous solution
Solution in 10 mM phosphate, pH 6.5, containing 0.15 M NaCl, 10 mM galactose, 0.5 mM dithioerythritol and 0.02% sodium azide
Highly purified by affinity chromatography
Electrophoretically pure (SDS-PAGE)
R: 42/43-26/27/28 S: 53-23-45-36/37/39

L 7886 [5-FC] **Agglutinin RCA_{120}** 5 mg 50.50 US $
from *Ricinus communis* (castor bean) 10 mg 83.05
Buffered aqueous solution
Solution in 0.005 M sodium phosphate and 0.2 M sodium chloride, pH 7.2, containing 0.1% sodium azide
Purified by affinity chromatography using the method of Ui, T.S. and Li, S.L., Eur. J. Biochem., 105, 453 (1980).
Agglutination activity is expressed in µg/ml and is determined from serial dilutions in phosphate buffered saline, pH 7.2, of a 1 mg protein per ml solution. This activity is the lowest concentration to agglutinate a 2% suspension of human erythrocytes after 1 hour incubation at 25°C.
Potency: <1 µg per ml
R: 42/43-26/27/28 S: 53-36-45

L 2758 [5-FC] **Lectin, Peroxidase labeled,** 250 µg 38.90
Agglutinin RCA_{120} 1 mg 105.00
from Ricinus communis **(castor bean)**
Lyophilized powder
Contains sodium citrate
Prepared from peroxidase type VI using a two step glutaraldehyde method of Avrameas, S. and Ternynck, T., Immunochemistry, 8, 1175 (1971).
Repurified after conjugation by affinity chromatography.
Unit definition: One unit will form 1 mg purpurogallin in 20 sec from pyrogallol at pH 6.0 at 20°C.
Protein approx. 75% by modified Warburg-Christian
R: 42/43-26/27/28 S: 53-36-45

L 2390 [5-FC] **Lectin–Agarose** 1 mL 56.80
from *Ricinus communis* (castor bean) 2 mL 101.90
Saline suspension
Ricinus communis agglutinin (RCA) occurs in two forms designated RCA_{60} and RCA_{120} according to their mol. wt. of approx. 60,000 and 120,000 respectively.[1] Neither RCA_{60} nor RCA_{120} is blood group specific. RCA_{60}, also referred to as RCA_I,[2] Ricin D[3] or RCL III[4] is extremely toxic, inhibits protein synthesis and has an affinity for N-acetyl-D-galactosamine. RCA_{120}, also referred to as RCA_{II}[2] or RCL I + II[4] is an agglutinin and has an affinity for terminal β-D-galactosyl residues.[3]
Conjugates are prepared from affinity purified toxin, RCA_{60}, or agglutinin RCA_{120}.
WARNING: Extremely hazardous! Be aware of the risks and familiar with safety procedures before you use this product.
Suspension in 1.0 M NaCl containing 0.02% thimerosal and 0.02% sodium azide
Extent of labeling ..... 2-4 mg protein per mL
Matrix ..... cross-linked 4% beaded agarose
Matrix activation ..... p-nitrophenyl chloroformate
Matrix spacer ..... 1 atom
Ref.: 1. Nicholson, G.L., et al., Biochemistry 13, 196 (1974)
2. Ui, T.S., U, S.L., Eur. J. Biochem. 105, 453 (1980)
3. Nicholson, G.L., Blanstein, J., Biochim. Biophys. Acta 266, 543 (1972)
4. Wei, C.H., Koh, C., J. Mol. Biol. 123, 707 (1978)

Lectin
from *Tetragonolobus purpureas* (Lotus *tetragonolobus*, winged or asparagus pea)
Tetragonolobus purpureas agglutinin (Lotus agglutinin) has anti-H blood group specificity. The lectin has an affinity for α-L-fucosyl residues and an unusually high affinity for α-L-fucose residues on type 2 chain blood group oligosaccharides.
Conjugates are prepared from affinity purified lectin.

US $ (Continuation of)
Lectin

L 9254 [3-PC] — Lyophilized powder — 5 mg — 70.00
Purified by affinity chromatography.
Agglutination activity is expressed in µg per ml and is determined from serial dilutions in phosphate buffered saline, pH 6.8, of a 1 mg per ml solution.
This activity is the lowest concentration to agglutinate a 2% suspension of human blood group O erythrocytes after 1 hr incubation at 25°C.
Potency: <32 µg per mL
salt ..... free

L 3134 [3-PC] — Lectin, Biotin labeled — 1 mg — 98.95
from *Tetragonolobus purpureas* (*Lotus tetragonolobus*, winged or asparagus pea) — 5 mg — 379.60
Lyophilized powder
Package size based on protein content
Contains sodium citrate
Protein approx. 85% by $E^{1\%}_{280}$
Extent of labeling .... approx. 6 mol biotin per mol protein

L 5644 [3-FITC] — Lectin, FITC labeled — 1 mg — 54.10
from *Tetragonolobus purpureas* (*Lotus tetragonolobus*, winged or asparagus pea)
Lyophilized powder
Extent of labeling ..... 2-6 mol FITC per mol protein
salt ..... free

L 5759 [3-PC] — Lectin, Peroxidase labeled — 250 µg — 47.55
from *Tetragonolobus purpureas* (*Lotus tetragonolobus*, winged or asparagus pea) — 1 mg — 178.80
Lyophilized powder
Containing sodium citrate
Prepared from peroxidase type VI using a modification of the method of O'Sullivan, M.J., et al., FEBS Lett., 95, 311 (1978) which favors *low* molecular weight conjugates. Repurified after conjugation by affinity chromatography.
Package size based on protein content
Unit definition: One unit will form 1 mg purpurogallin in 20 sec from pyrogallol at pH 6.0 at 20°C.
Protein approx. 90% by modified Warburg-Christian

Lectin
from *Triticum vulgaris*
Wheat germ agglutinin (WGA) is not blood group specific but has an affinity for N-acetyl-β-D-glucosaminyl residues and N-acetyl-β-D-glucosamine oligomers. WGA contains no protein-bound carbohydrate.
Triticum vulgaris wheat germ
Conjugates are prepared from affinity purified lectin.

L 9640 [3-PC] — Lectin — 10 mg — 67.35
from *Triticum vulgaris* — 25 mg — 122.10
Lyophilized powder — 100 mg — 373.10
Agglutination activity is expressed in µg per ml and is determined from serial dilutions in phosphate buffered saline, pH 6.8, of a 1 mg per ml solution. This activity is the lowest concentration to agglutinate a 2% suspension of human erythrocytes after 1 hr incubation at 25°C.
Potency: <20 µg per mL
salt ..... essentially free
S 22-2425

L 0636 [3-PC] — Lyophilized powder, cell culture tested — 5 mg — 47.70
Highly purified
aseptically processed
salt ..... essentially free

L 1882 [3-FITC] — Lectin-Agarose — 1 ml — 107.25
from *Triticum vulgaris* — 5 ml — 320.25
Saline suspension — 10 ml — 533.85
Wheat germ agglutinin, immobilized on agarose CL-4B
Sugar specificity: (D-N-acetylglucosamine)$_2$, N-acetylneuraminic acid
Suspension in 1.0 M NaCl containing 0.02% thimerosal
Extent of labeling ..... 5-10 mg per ml
Matrix ..... cross-linked 4% beaded agarose
Matrix activation ..... cyanogen bromide
S 24/25

L 1394 [3-FITC] — Lectin-Agrose — 1 ml — 65.50
from *Triticum vulgaris* — 5 mL — 298.70
200-300 µm, Saline suspension — 10 mL — 473.95
Used for the purification of glycoproteins containing (D-N-acetylglucosamine)$_2$ or N-acetylneuraminic acid.
Sugar specificity: (D-N-acetylglucosamine)$_2$ N-acetylneuraminic acid
Suspension in 0.9% NaCl containing 0.01% thimerosal
Extent of labeling ..... approx. 6 mg per ml
Matrix ..... 6% agarose macrobeads
Matrix activation ..... cyanogen bromide
Matrix spacer ..... 1 atom
Binding capacity, ovomucoid ..... 1-2 mg/ml
Ref.: Christie, D.L., and Palmer, D.J., *Biochem. J.* 270, 57-61 (1990)

L 6257 [3-PC] — Lectin-Sepharose 6MB — 1 mL — 137.85
from *Triticum vulgaris* — 5 ml — 459.45
200-300 µm, Saline suspension — 10 ml — 765.75
Sugar specificity: (D-N-acetylglucosamine)$_2$ N-acetylneuraminic acid
Suspension in 0.9% NaCl and 0.01% thimerosal
Extent of labeling ..... approx. 5 mg per mL
Matrix ..... Sepharose 6MB
Binding capacity, ovomucoid ..... 1 mg/ml
R 39/37/38 S 16-26-36

L 5142 [3-FITC] — Lectin, Biotin labeled — 1 mg — 27.85
from *Triticum vulgaris* — 5 mg — 86.65
Lyophilized powder
Contains sodium citrate
Package size based on protein content
Protein approx. 85%
Extent of labeling ..... 2 mol biotin per mol protein

L 9884 [3-PC] — Lectin, Evans Blue labeled — 1 mg — 43.15
from *Triticum vulgaris*
Lyophilized powder
Contains citrate buffer salts
Package size based on protein content.
Protein approx. 85%
Extent of labeling .. approx. 2 mol Evans Blue per mol protein

L 4895 [3-PC] — Lectin, FITC labeled — 2 mg — 39.85
from *Triticum vulgaris* — 5 mg — 79.30
Lyophilized powder — 10 mg — 144.70
Contains phosphate buffer salts
Package size based on protein content.
Protein approx. 50% by Lowry
Extent of labeling ..... approx. 2 mol FITC per mol protein

L 8896 [3-PC] — 10 nm (colloidal gold), approx. 5 A_{520} units/mL, Aqueous glycerol suspension — 0.2 ml — 28.60 — 1 mL — 94.55
Suspension in approx. 50% glycerol containing 0.15 M NaCl, 0.01 M sodium phosphate, pH 7.2, 0.02% PEG 20, and 0.02% sodium azide
Ref.: Horisberger, M., Bullet, I. and Perrot, eds., *Techniques in Immunocytochemistry* (1985), 3, 155

L 3892 [3-PC] — Lectin, Peroxidase labeled — 1 mg — 89.15
from *Triticum vulgaris* — 2 mg — 147.25
Lyophilized powder — 5 mg — 313.50
Contains citrate buffer
Prepared from peroxidase type VI using a modification of the method of O'Sullivan, M.J., et al., FEBS Lett., 95, 311 (1978) which favors low molecular weight conjugates. Repurified after conjugation by affinity chromatography.
Package size based on protein content.
Unit definition: One unit will form 1.0 mg of purpurogallin from pyrogallol in 20 sec at pH 6.0 at 20°C.
Protein approx. 90% by modified Warburg-Christian
S 22-24/25

L 7017 [3-PC] — Lectin, Peroxidase labeled — 500 µg — 85.70
from *Triticum vulgaris* — 1 mg — 141.35
Package size based on protein content.
Same as L3892, but packaged in microcone vials for ease of reconstitution and recovery of microliter volumes.

L 0390 [3-PC] — Lectin, Peroxidase, inactivated, labeled — 250 µg — 52.00 — 500 µg — 86.15
from *Triticum vulgaris* — 1 mg — 133.25
Lyophilized powder
Potentially useful as an alternate probe in dual neuronal transport studies when labeled with an appropriate marker.
Contains sodium citrate
Prepared from inactivated peroxidase, P 6278, using a modification of the method of O'Sullivan, M.J., et al., FEBS Lett., 95, 311 (1978).
Package size based on protein content.
Unit definition: One unit will form 1 mg purpurogallin in 20 sec from pyrogallol at pH 6.0 at 20°C.
Protein approx. 50% by modified Warburg-Christian
Peroxidase Activity ..... <0.01 unit/mg protein

L 5266 [3-PC] — Lectin, TRITC labeled — 2 mg — 97.10
from *Triticum vulgaris*
Lyophilized powder
Contains phosphate buffer salts and NaCl
Package size based on protein content.
Protein approx. 10% by Lowry
Extent of labeling ..... approx. 1 mol TRITC per mol protein

L 2382 [3-PC] — Lectin-Agarose — 1 mL — 60.55
from *Ulex europaeus* (gorse, furze) — 2 mL — 100.65
UEA-I
Saline suspension
Ulex europaeus agglutinin (UEA) has anti-H blood group specificity. There are two types of lectin: UEA I has an affinity for L-fucose and UEA II has an affinity for N,N'-diacetylchitobiose. The mol. wt. of UEA I was initially found to be 170,000. Later reports indicate that UEA I may form aggregates at neutral and basic pH and that the correct mol. wt. is 68,000.
Suspension in 1.0 M NaCl with 0.01% thimerosal
Extent of labeling ..... 2-4 mg per ml
Matrix ..... cross-linked 4% beaded agarose
Binding capacity, BSA-fucose/amide ... approx. 3 mg/ml gel
Ref.: 1. Allen, H.J., Johnson, E.A.Z., *Carbohydr. Res.* 58, 253 (1977)
2. Horejsi, V., Kocourek, J., *Biochim. Biophys. Acta* 336, 329 (1974)
3. Matsumoto, I., Osawa, T., *Biochim. Biophys. Acta* 194, 180 (1969)

Lectin — US $
from *Ulex europaeus* (gorse, furze)
UEA-I
Ulex europaeus agglutinin (UEA) has anti-H blood group specificity. There are two types of lectin: UEA I has an affinity for L-fucose and UEA II has an affinity for N,N'-diacetylchitobiose. The mol. wt. of UEA I was initially found to be 170,000. Later reports indicate that UEA I may form aggregates at neutral and basic pH and that the correct mol. wt. is 68,000.
Ref.: 1. Allen, H.J., Johnson, E.A.Z., *Carbohydr. Res.* 58, 253 (1977)
2. Horejsi, V., Kocourek, J., *Biochim. Biophys. Acta* 336, 329 (1974)
3. Matsumoto, I., Osawa, T., *Biochim. Biophys. Acta* 194, 180 (1969)

L 5505 [3-PC] — Lyophilized powder — 2 mg — 53.55
Purified by affinity chromatography — 5 mg — 95.00
using the method of Pereira, M.E.A., et al., *Arch. Biochem. Biophys.*, 185, 109 (1978). — 10 mg — 187.70
Agglutination activity is expressed in µg per ml and is determined from serial dilutions in phosphate buffered saline, pH 6.8, of a 1 mg per ml solution. This activity is the lowest concentration to agglutinate a 2% suspension of human blood group O erythrocytes after 1 hr incubation at 25°C.
Potency: <8 µg per ml.
salt ..... essentially free

L 8262 [3-PC] — Lectin, Biotin labeled — 500 µg — 38.00
from *Ulex europaeus* (gorse, furze) — 2 mg — 87.20
Lyophilized powder
Contains sodium citrate
Package size based on protein content.
Protein approx. 85% by $E^{1\%}_{280}$
Extent of labeling ..... approx. 3 mol biotin per mol protein

L 9008 [3-PC] — Lectin, FITC labeled — 1 mg — 54.40
from *Ulex europaeus* (gorse, furze) — 2 mg — 90.60
Lyophilized powder
Contains potassium phosphate buffer salts and NaCl
Package size based on protein content.
Protein approx. 10% by Lowry
Extent of labeling ..... 2-5 mol FITC per mol protein

L 8146 [3-PC] — Lectin, Peroxidase labeled — 500 µg — 70.50
from *Ulex europaeus* (gorse, furze) — 1 mg — 118.40
Lyophilized powder
Contains sodium citrate buffer salts
Prepared from peroxidase, Type VI, using the two-step glutaraldehyde method of Avrameas, S. and Ternynck, T., *Immunochemistry*, 8, 1175 (1971).
Repurified by affinity chromatography after conjugation
Package size based on protein content.
Unit definition: One unit will form 1.0 mg purpurogallin in 20 sec from pyrogallol at pH 6.0 at 20°C.
Protein approx. 80% by Lowry

L 4889 [3-PC] — Lectin, TRITC labeled — 500 µg — 96.05
from *Ulex europaeus* (gorse, furze)
Lyophilized powder
Contains potassium phosphate buffer salts and sodium chloride
Package size based on protein content
Protein approx. 10% by Lowry
Extent of labeling ..... 4-8 mol TRITC per mol lectin

US $	**Lectin**		1 mg	60.10
L 6263	**from *Vicia faba* (fava bean, broad bean)**			
	Lyophilized powder			
	Vicia faba agglutinin (VFA) is not blood group specific, but has an affinity for D-mannose and D-glucose.[1]			
	Contains sodium chloride, phosphate buffer salts and stabilizer.			
	Purified by affinity chromatography using the method of Matsumoto, I., *et al.*, J. Biochem., 93, 763 (1983).			
	Package size based on protein content.			
	Agglutination activity is expressed in µg per ml and is determined from serial dilutions in phosphate buffered saline, pH 6.8, of a 1 mg per ml solution. This activity is the lowest concentration to agglutinate a 2% suspension of human erythrocytes after 1 hr incubation at 25°C.			
	Potency: <20 µg per ml			
	Protein approx. 20% by Biuret			
	Lectin			
	from Vicia villosa (hairy vetch)			
	Vicia villosa agglutinin (VVA) has an affinity for N-acetyl-D-galactosamine. There are at least three tetrameric VVA isolectins composed of subunits A and B, designated B_4, A_2B_2 and A_4. Isolectin B_4 is specific for Tn activated erythrocytes; A_4 has anti-A_1 blood group specificity and A_2B_2 has a specificity intermediate between A_4 and B_4. There is an additional non-blood group specific lectin in seed extracts.			
	Conjugates are prepared from affinity purified lectin.			
L 4011	Lyophilized powder		1 mg	13.45
	May contain at least two isolectins.			
	Contains sodium citrate			
	Affinity purified by a modification of the method of Grubhoffer, L., et al., Biochem. J., 195, 626 (1981).			
	Package size based on protein content			
	Two major bands on SDS-PAGE.			
	Potency: <65 µg per mL (using blood group A_1 erythrocytes. Does not agglutinate blood group B or O erythrocytes at 250 µg per ml)			
	Protein 95%			
L 5388	**Lectin-Agrose**		5 mg	117.35
	from Vicia villosa (hairy vetch)			
	Aqueous glycerol suspension			
	Suspension in 50% glycerol containing 0.15 M NaCl, 0.01 M NaH_2PO_4, pH 7.0, and 0.02% sodium azide			
	Package size based on protein content			
	Extent of labeling	2-9 mg per ml		
	Matrix	4% beaded agarose		
	Matrix activation	epichlorohydrin		
	Matrix attachment	amino of protein		
	Matrix spacer	3 atoms		
	Binding capacity, alkumin-NH-phenyl-N-acetyl-D-galactosamine	approx. 1.5 mg/ml		
L 7513	**Lectin, Isolectin B_4**		1 mg	25.75
	from Vicia villosa (hairy vetch)		5 mg	94.65
	Lyophilized powder			
	Contains sodium phosphate buffer salts			
	Affinity purified by a modification of the method of Tollefsen, S.E. and Kornfeld, R., J. Biol. Chem., 258, 5165 (1983).			
	Package size based on protein content			
	Single major band on SDS electrophoresis.			
	Potency: < 0.5 µg per mL (using neuraminidase and β-galactosidase treated blood group O erythrocytes (Tn-activated). Does not agglutinate untreated blood group A,B or O erythrocytes at 250 µg per ml)			
	Protein approx. 95% by Biuret			
L 7888	**Lectin, Isolectin B_4-Agrose**		0.5 ml	
	from Vicia villosa (hairy vetch)		1 mL	
	Aqueous glycerol suspension			
	Suspension in 50% glycerol containing 0.15 M [illegible] 0.01 M NaH_2PO_4, 0.02% sodium azide and trace metals			
	Extent of labeling	3-6 mg protein ($E^{1\%}_{280}$) per ml		
	Matrix	4% beaded A[illegible]		
	Matrix activation			
	Matrix attachment			
	Matrix spacer			
	Binding capacity, alkumin-p-aminophenyl-N-acetyl-D-galactosamine	4-8 mg		
	Lectin			
	from *Wisteria floribunda*			
	Wisteria floribunda agglutinin (WFA) is not blood group specific, but has an affinity for N-acetyl-D-galactosamine.[1]			
	Contains sodium citrate			
	Package size based on protein content			
L 1516	**Lectin, Biotin labeled**		500 µg	75
	from *Wisteria floribunda*		2 mg	88
	Lyophilized powder			
	Procein is biotinylated utilizing aminocaproyl spacer			
	Protein approx. 95% by Biuret			
	Extent of labeling	approx. 4 mol biotin per mol prote		
L 1641	**Lectin, FITC labeled**		2 mg	80
	from *Wisteria floribunda*			
	Lyophilized powder			
	Protein approx. 95% by Biuret			
	Extent of labeling	approx. 3 mol FITC per mol prote		
L 2016	**Lectin, reduced**		1 mg	61
	from *Wisteria floribunda*			
	Lyophilized powder			
	Activity: No agglutination of Type A RBC's at 250 µg per ml			
	Protein approx. 95% by $E^{1\%}_{280}$			
L 3766	**Lectin, Biotin labeled**		500 µg	430
	from *Wisteria floribunda*			
	Lyophilized powder			
	Biotinylated via aminocaproyl spacer.			
	Protein approx. 95% by $E^{1\%}_{280}$			
	Extent of labeling	approx. 4 mol biotin per mol pro		
	Lectin			
	from *Helix pomatia*			
	Helix pomatia agglutinin (HPA) has anti-A human blood group specificity and has an affinity for terminal N-acetyl-α-D-galactosaminyl residues.[1] Conjugates are prepared from affinity purified lectin			
	Refs.: 1. Hammarstrom, S., Kabat, E. A., Biochemistry 10, 1681 (1971)			
	2. Hammarstrom, S., Scand. J. Immunol. 1, 295 (1972)			
L 8639	**Lectin-Agarose**		1 mL	89.6
	from *Helix pomatia*		3 mL	294.75
	Saline suspension			
	Suspension in 0.5 M NaCl, 10 mM phosphate buffer, pH 7.3, and 0.02% sodium azide			
	Extent of labeling	approx. 1.5 mg lectin per ml		
	Matrix	cross-linked 4% beaded agarose		
L 3382	**Lyophilized powder**		1 mg	55.7
	Affinity purified by a modification of the method of Hammarstrom and Kabat, Biochemistry, 10, 1684 (1971).		5 mg	223.75
	Agglutination activity is expressed in µg per ml and is determined from serial dilutions in phosphate buffered saline, pH 6.8, of a 1 mg per ml solution. This activity is the lowest concentration to agglutinate a 2% suspension of human blood group A erythrocytes after 1 hr incubation at 25°C.			
	Potency: <4 µg per mL			
	salt			fre
	Lyophilized powder		1 vial	12.55
	Reconstitute with 5.0 ml of 0.9% saline solution or 0.01M phosphate buffered saline for a working strength reagent for determining human Type A_1 blood in tube or tile tests.			
	Vial of 5 ml			
L 6512	**Lectin, Biotin labeled**		1 mg	72.70
	from *Helix pomatia*			
	Lyophilized powder			
	Extent of labeling	2-4 mol biotin per mol protein		
	salt			free
L 1034	**Lectin, FITC labeled**		1 mL	69.50
	from *Helix pomatia*			
	Buffered aqueous solution			
	Solution in 0.01 M Tris, pH 8.0, containing 0.15 M NaCl and 0.1% sodium azide			
	Agglutination activity is expressed in µg per ml and is determined from serial dilutions in phosphate buffered saline, pH 6.8, of a 1 mg per ml solution. This activity is the lowest concentration to agglutinate a 2% suspension of human blood group A erythrocytes after 1 hr incubation at 25°C.			
	Potency: <1 µg per ml			
	Protein 20.5 mg/ml			
	Extent of labeling	2-5 mol FITC per mol protein		
L 6387	**Lectin, Peroxidase labeled**		500 µg	90.10
	from *Helix pomatia*		1 mg	149.95
	Lyophilized powder			
	Contains sodium chloride			
	Prepared from peroxidase Type VI using a modification of the method of O'Sullivan, M.J., et al., FEBS Lett., 95, 311 (1978), which favors low molecular weight conjugates. Repurified by affinity chromatography after conjugation.			
	Unit definition: One unit will form 1.0 mg purpurogallin from pyrogallol in 20 sec at pH 6.0 at 20°C.			
	Protein minimum 99% by Lowry			
L 7261	**Lectin, TRITC labeled**		1 mg	74.70
	from *Helix pomatia*			
	Lyophilized powder			
	Extent of labeling	approx. 1 mol TRITC per mol protein		
	salt			free
	Lectin			
	from *Helix aspersa* (garden snail)			
	Helix aspersa agglutinin (HAA) has anti-A human blood group specificity and an affinity for terminal N-acetyl-α-D-galactosaminyl residues. Conjugates are prepared from affinity purified lectin.			
	Agglutination activity is expressed in µg per ml and is determined from serial dilutions in phosphate buffered saline, pH 6.8, of a 1 mg per ml solution. This activity is the lowest concentration to agglutinate a 2% suspension of human blood group A erythrocytes after 1 hr incubation at 25°C.			
	salt			free
	Refs.: 1. Uhlenbruck, G., Scand. J. Immunol. 3, 125 (1972)			
	2. Hammarstrom, S., Scand. J. Immunol. 1, 295 (1972)			
	3. Pemberton, R. T., Vox Sang. 16, 457 (1969)			
L 6635	**Lyophilized powder**		1 mg	55.30
	Affinity purified by a modification of the method of Hammarstrom, S. and Kabat, E.A., Biochemistry, 8, 2969 (1969).			
	Potency: <2 µg per ml			
L 8764	**Lectin, Biotin labeled**		1 mg	72.70
	from *Helix aspersa* (garden snail)			
	Lyophilized powder			
	Extent of labeling	approx. 2 mol biotin per mol lectin		
	Anti-Lectin, Arachis hypogaea		1 vial	69.60 US $
A 4404	**from rabbit**			
	Anti-PNA; Anti-Peanut Lectin			
	Lyophilized powder, Fractionated antiserum			
	Lectins are highly specific carbohydrate binding proteins useful in carbohydrate and cell membrane studies, as well as cell agglutination and typing techniques.			
	Immunogen: Peanut lectin (PNA)			
	Lyophilized from 0.01 M phosphate buffered saline, pH 7.2			
	Reconstitute with 2 ml deionized water.			
	Application(s)			
	Ouchterlony double diffusion			1:8
	vial of approx. 2 mL Lyophilized antiserum			
	Anti-Lectin, Canavalia ensiformis		1 vial	72.40
C 7401	**from rabbit**			
	Anti-Con A; Anti-Jack Bean Concanavalin A			
	Lyophilized powder, Fractionated antiserum			
	Lectins are highly specific carbohydrate binding proteins useful in carbohydrate and cell membrane studies, as well as cell agglutination and typing techniques.			
	Immunogen: Jack Bean Concanavalin A (Con A)			
	Lyophilized from 0.01 M phosphate buffered saline, pH 7.2			
	Reconstitute with 2 ml deionized water.			
	Application(s)			
	Ouchterlony double diffusion			1:8
	vial of approx. 2 mL lyophilized antiserum			
	Anti-Lectin, *Ricinus communis* (RCA_{60})		1 vial	72.40
R 1254	from rabbit			
	Anti-RCA_{60}; Anti-Castor bean lectin			
	Lyophilized powder, Fractionated antiserum			
	Lectins are highly specific carbohydrate binding proteins useful in carbohydrate and cell membrane studies, as well as cell agglutination and typing techniques			
	Immunogen: Castor Bean lectin (RCA_{60}, RCA_{β})			
	Lyophilized from 0.01 M phosphate buffered saline, pH 7.2			
	Reconstitute with 2 ml deionized water.			
	Application(s)			
	Ouchterlony double diffusion			1:8
	vial of 2 mL lyophilized antiserum			
	Anti-Lectin, Triticum vulgaris		1 vial	72.40
T 4144	**from rabbit**			
	Anti-WGA; Anti-Wheat germ lectin			
	Lyophilized powder, Fractionated antiserum			
	Lectins are highly specific carbohydrate binding proteins useful in carbohydrate and cell membrane studies, as well as cell agglutination and typing techniques.			
	Immunogen: Wheat Germ lectin (WGA)			
	Lyophilized from 0.01 M phosphate buffered saline, pH 7.2			
	Reconstitute with 2 ml deionized water.			
	Application(s)			
	Ouchterlony double diffusion			1:8
	vial of 2 ml			
	Anti-Lectin, Ulex europaeus-I		0.5 ml	30.60
U 4754	**from rabbit**			
	Anti-UEA-I; Anti-Gorse or Furze			
per kit	Lectin			
	Liquid, Fractionated antiserum			
	Lectins are highly specific carbohydrate binding proteins useful in carbohydrate and cell membrane studies, as well as cell agglutination and typing techniques.			
	Immunogen: Ulex europaeus from gorse seeds			
	The product may be used for studies of the vascular structures. The antibody reacts specifically with UEA-I			

APPENDIX C:

Complement available from Sigma-Aldrich: 2002-2003 catalog

100 µg 114.00

in 10
mM
00,000 C6H50 units/

ve hemolytic assay.

1 mL 89.10

orption
hemo-

122, 2103 (1979)

100 µg 91.50

in 10
0 mM
200,000 C7H50 units/

ive hemolytic assay.

1 mL 93.80

sorption
e hemo-

l. 122, 2103 (1979)

100 µg 109.15

pH 7.2,
units/mg protein
, suitable for radio-

ve hemolytic assay using

1 mL 96.65

sorption
ve hemo-

ol. 122, 2103 (1979)

100 µg 100.10

pH
50 units/mg (using C9

ive hemolytic assay using

1 mL 96.65

dsorption
ive hemo-

ol. 122, 2103 (1979)

500 µg 136.75
1 mg 257.95

l C1s, in
C1 complex which is the
sical complement path-
composed of 18
x B, Six C)(MW 460kd). All
in an 81-aa collagen-like
(aa-Yaa) repeating
rminus. These three types

of chains interact in sets of three (A,B,C) to form a triple helix with the C-terminus forming the globular heads which may be structurally and functionally distinct domains. One C1q molecule is comprised of six triple helices.
Lyophilized from 0.05 M Tris buffer, pH 7.3, containing 0.5 M NaCl
Pkg based on weight of protein
Single band by immunoelectrophoresis at 20 µg protein per gel against anti-C1q serum; single or no band against anti-whole serum. No visible reaction against anti-IgG, anti-IgM and anti-IgA sera at 20 µg protein per gel.
Ref.: 1. Tas, S.W., et al., C1q and C4b bind simultaneously to CR1 and additively support erythrocyte adhesion. *J. Immunol.* **163**, 5056-5063 (1999)
2. Navratil, J.S., et al., Systemic lupus erythematosus and complement deficiency: clues to a novel role for the classical complement pathway in the maintenance of immune tolerance. *Immunopharmacology* **42**, 47-52 (1999)
3. Kishore, U. and Reid, K. B., Modular organization of proteins containing C1q-like globular domain *Immunopharmacology* **42**, 15-21 (1999)
4. Ruiz, S., et al., Digestion of C1q collagen-like domain with MMPs-1,-2,-3, and -9 further defines the sequence involved in the stimulation of neutrophil superoxide production. J. Leukoc. Biol. *J. Leukocyte Biol.* **66**, 416-422 (1999)

Complement factor D 10 µg 123.30
C 5688 **from human plasma**
-20°C *[37213-56-2]*
DRY ICE **>90% (SDS-PAGE), 100 µg/mL in PBS, pH 7.2**
Ref.: Niemann, M.A., et al., *J. Immunol.* **132**, 809 (1984)

Complement factor H 100 µg 115.75
C 5813 **from human plasma**
-20°C *[80295-65-4]*
DRY ICE **>90% (SDS-PAGE), 1 mg/mL in PBS, pH 7.2**
C3b-binding protein which regulates the formation and function of complement C3 and C5 convertases.
Ref.: 1. Fearon, D.T. and Austen, K.F., *Proc. Natl. Acad. Sci. USA* **74**, 1683 (1977)
2. Pangburn, M.K. and Muller-Eberhard, H.J., *Springer Semin. Immunopath.* **7**, 63 (1984)

Complement factor I 100 µg 202.50
C 5938 **from human plasma**
-20°C *[80295-66-5]* EC 3.4.21.45
DRY ICE **>90% (SDS-PAGE), 1 mg/mL in PBS, pH 7.2**
Protease which cleaves and inactivates C3b and C4b
Ref.: Pangburn, M.K., et al., *J. Exp. Med.* **146**, 257 (1977)

Complement sera

S 1639 **Complement sera from guinea pig** 1 mL 32.45; 5 mL 61.95; 10 x 5 mL 167.60
-70°C DRY ICE **Lyophilized powder**
Lyophilized powder from indicated amount of serum
Hemolytic titer (CH50 units per ml) is determined by method of Kabat and Mayer. Actual titer given on label.
Ref.: Kabat, E.A. and Mayer, M.M., *Experimental Immunochemistry* 2nd ed., Springfield, Illinois (1961).

US $

S 1764 **Complement sera human** 1 mL 35.55; 5 x 1 mL 68.15
-70°C DRY ICE **Lyophilized powder**
Lyophilized powder from indicated amount of serum
Hemolytic titer (CH50 units per ml) is determined by method of Kabat and Mayer. Actual titer given on label.
Ref.: Kabat, E.A. and Mayer, M.M., *Experimental Immunochemistry* 2nd ed., Springfield, Illinois (1961).

S 3269 **Complement sera from mouse** 1 mL 69.30
-70°C DRY ICE **Lyophilized powder**
Lyophilized powder from indicated amount of serum
Hemolytic titer (CH50 units per ml) is determined by the method of Kabat and Mayer. Actual titer given on the label.
Ref.: Kabat, E.A. and Mayer, M.M., *Experimental Immunochemistry* 2nd ed., Springfield, Illinois (1961).

S 7764 **Complement sera from rabbit** 1 mL 46.15; 5 mL 60.25
-70°C DRY ICE **Lyophilized powder**
Lyophilized powder from indicated amount of serum

S 3394 **Complement sera from rat** 1 mL 57.80; 5 x 1 mL 149.50
-70°C DRY ICE **Lyophilized powder**
Lyophilized powder from indicated amount of serum
Hemolytic titer (CH50 units per ml) is determined by the method of Kabat and Mayer. Actual titer given on the label.
Ref.: Kabat, E.A. and Mayer, M.M., *Experimental Immunochemistry* 2nd ed., Springfield, Illinois (1961).

C 9473 **Complement sera Complement Serum Standard human** 1 mL 117.10
-70°C DRY ICE **Aqueous solution**
Substrate serum used as standard for quantitation of components C1q, C2, C3, C4, C5, C6, C7, C8, C9 and factor B.
Solution containing 10 mM EDTA
Classical pathway activity (CH50 units per ml), alternative pathway activity (AH50 units per ml), antigen levels by radioimmunoassay and functional activities by hemolytic assay are provided in data sheet.

Complement assay reagents

G 6514 **Gelatin veronal buffer** 50 mL 12.40; 5 x 50 mL 54.90
2-8°C GVB^{2+}
0.15 mM $CaCl_2$, 141 mM NaCl,
0.5 mM $MgCl_2$, 0.1% gelatin, 1.8 mM sodium barbital and 3.1 mM barbituric acid, pH 7.3-7.4.
Aseptically filtered

G 9660 **Gelatin veronal buffer-EDTA** 50 mL 11.40; 5 x 50 mL 50.50
2-8°C GVB-EDTA
Contains 141 mM NaCl, 0.1% gelatin, 1.8 mM sodium barbital, 3.1 mM barbituric acid and 10 mM EDTA, pH 7.3-7.4.
aseptically filtered

E 9383 **Antibody Sensitized Sheep Erythrocytes** 2 mL 225.00; 5 x 2 mL 749.90
2-8°C WET ICE EA7S
1×10^9 cells/mL, Buffered aqueous cell suspension, suitable for assay of complement component activity (H50 units) and whole complement activity (CH50 units)
Suspension in gelatin veronal buffer containing 0.1 M sucrose

Complexone I® See: Nitrilotriacetic acid *Page 1518*

Complexone V® See: Diethylenetriaminepentaacetic acid *Page 677*

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